

(12) **United States Patent**  
**Archambault et al.**

(10) **Patent No.:** **US 12,161,150 B2**  
(45) **Date of Patent:** **Dec. 10, 2024**

(54) **CANNABIS JOINTS FILLING SYSTEM**

FOREIGN PATENT DOCUMENTS

(71) Applicant: **Le Groupe Solid Packaging Robotik Inc.**, Terrebonne (CA)

CA 3079937 A1 5/2019  
WO WO 2021/081621 A1 \* 5/2021 ..... A24F 47/00

(72) Inventors: **Robert Archambault**, Boisbriand (CA);  
**Daniel Martel**, Terrebonne (CA);  
**Harold Bouchard**, Bois-des-Filion (CA)

OTHER PUBLICATIONS

Merriam-Webster\_Definition of Registered <https://web.archive.org/web/20200930073256/https://www.merriam-webster.com/dictionary/registered>, Retrieved May 20, 2024 (Year: 2020).\*  
CA 3133600—Office Action, Jun. 3, 2024.

(73) Assignee: **Le Groupe Solid Packaging Robotik Inc.**, Terrebonne (CA)

\* cited by examiner

(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 534 days.

*Primary Examiner* — Christopher M Rodd  
*Assistant Examiner* — Ronnie Kirby Jordan  
(74) *Attorney, Agent, or Firm* — Agence de Brevets Fournier

(21) Appl. No.: **17/496,435**

(22) Filed: **Oct. 7, 2021**

(65) **Prior Publication Data**

US 2023/0115581 A1 Apr. 13, 2023

(57) **ABSTRACT**

(51) **Int. Cl.**  
**A24C 1/02** (2006.01)  
**A24C 5/00** (2020.01)  
**A24C 5/02** (2006.01)

A cannabis joints filling system includes a cannabis joint filling apparatus for receiving and holding a paper cone along a longitudinal axis and for receiving and pre-compacting a predetermined quantity of cannabis into the paper cone; and a cannabis feeding system including i) a weighing scale, ii) a cannabis feeding apparatus adjacent the weighing scale for receiving cannabis in bulk and for controllably outputting a predetermined portion of the cannabis in bulk onto the weighing scale, and iii) a single portion cannabis distributing device, including two cups that are sequentially movable between a) a cannabis weighing position, wherein one of the two cups cooperates with the weighing scale to measure the predetermined portion of the cannabis, and b) a cannabis distributing position, where the predetermined portion of the cannabis is fed to the cannabis joint filling apparatus.

(52) **U.S. Cl.**  
CPC ..... **A24C 1/02** (2013.01); **A24C 5/002** (2013.01); **A24C 5/02** (2013.01)

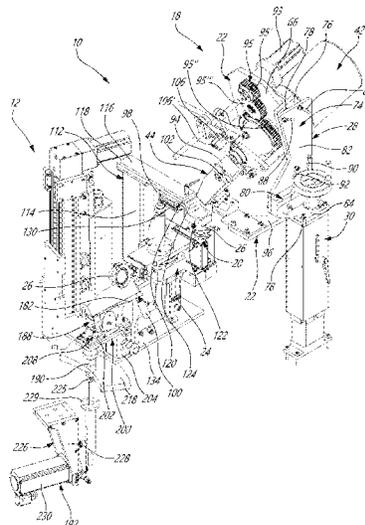
(58) **Field of Classification Search**  
CPC .. B65B 1/32; B65B 39/12; A24C 1/02; A24C 5/002; A24C 5/02  
See application file for complete search history.

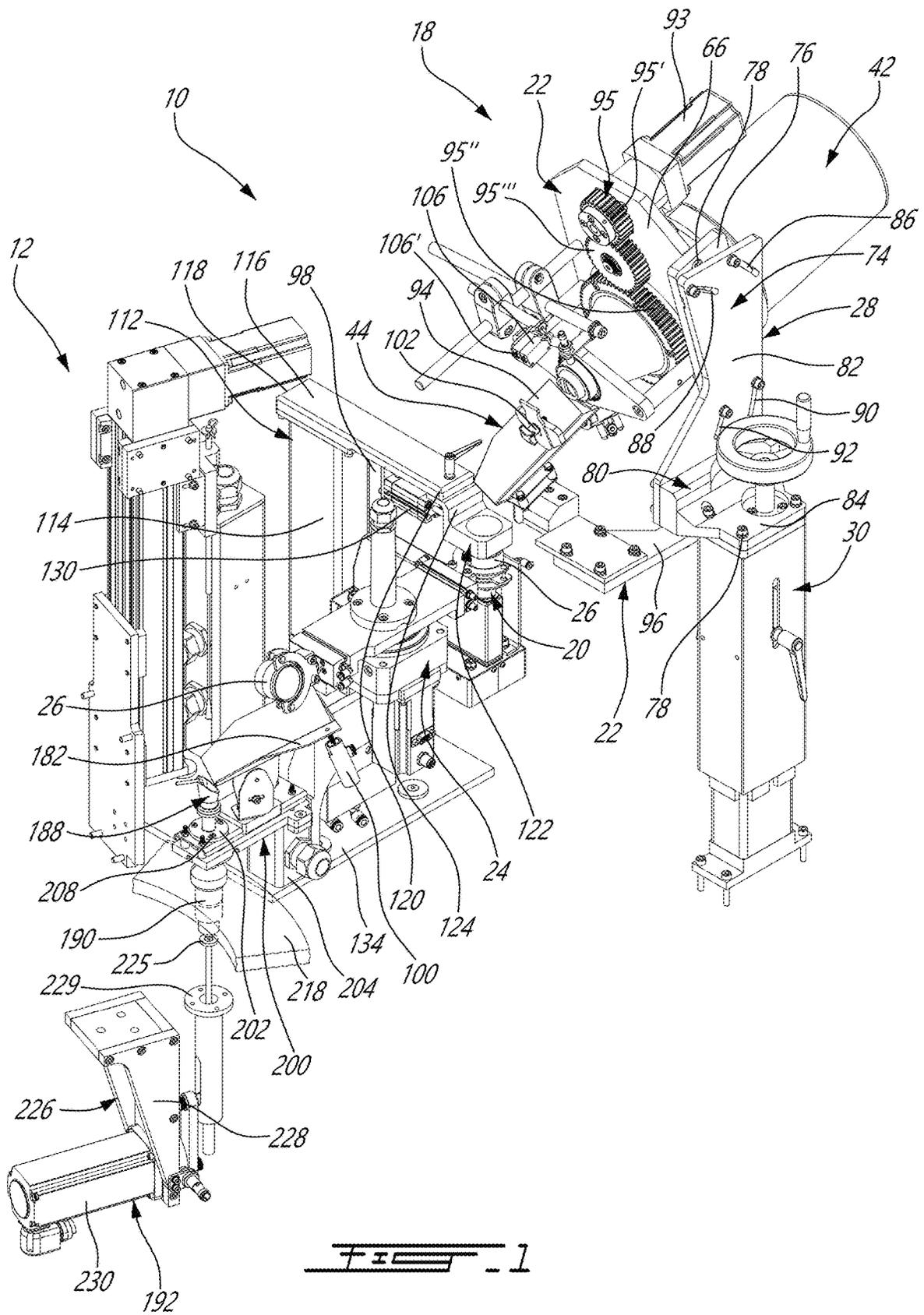
(56) **References Cited**

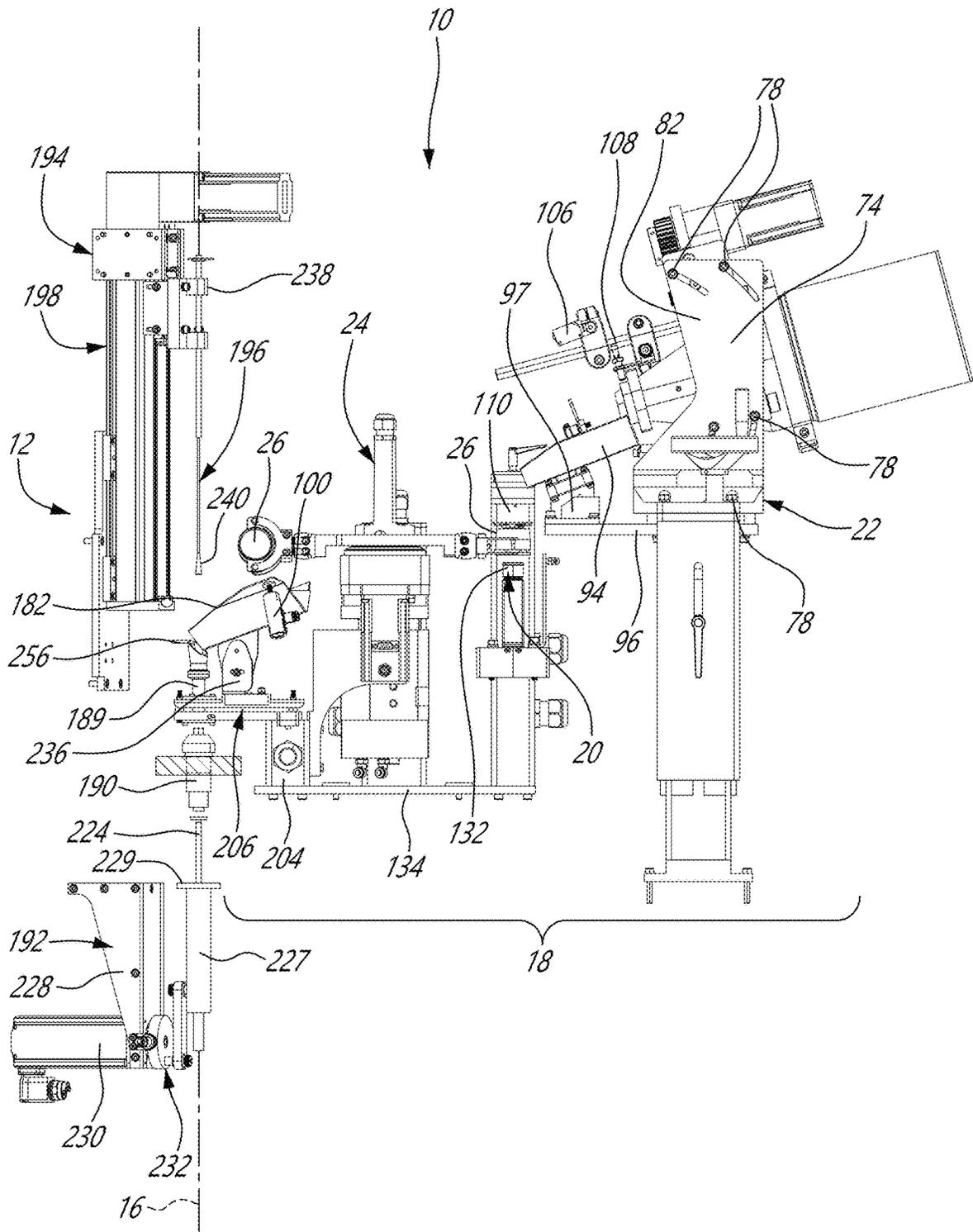
U.S. PATENT DOCUMENTS

2017/0119043 A1\* 5/2017 Swanson et al. .... A24C 5/42  
2021/0022388 A1 1/2021 Sullivan et al.  
2021/0030054 A1\* 2/2021 Gowdin et al. .... A24C 5/02  
2021/0392944 A1\* 12/2021 Kustal et al. .... A24C 5/02

**26 Claims, 17 Drawing Sheets**







**FIG. 2**

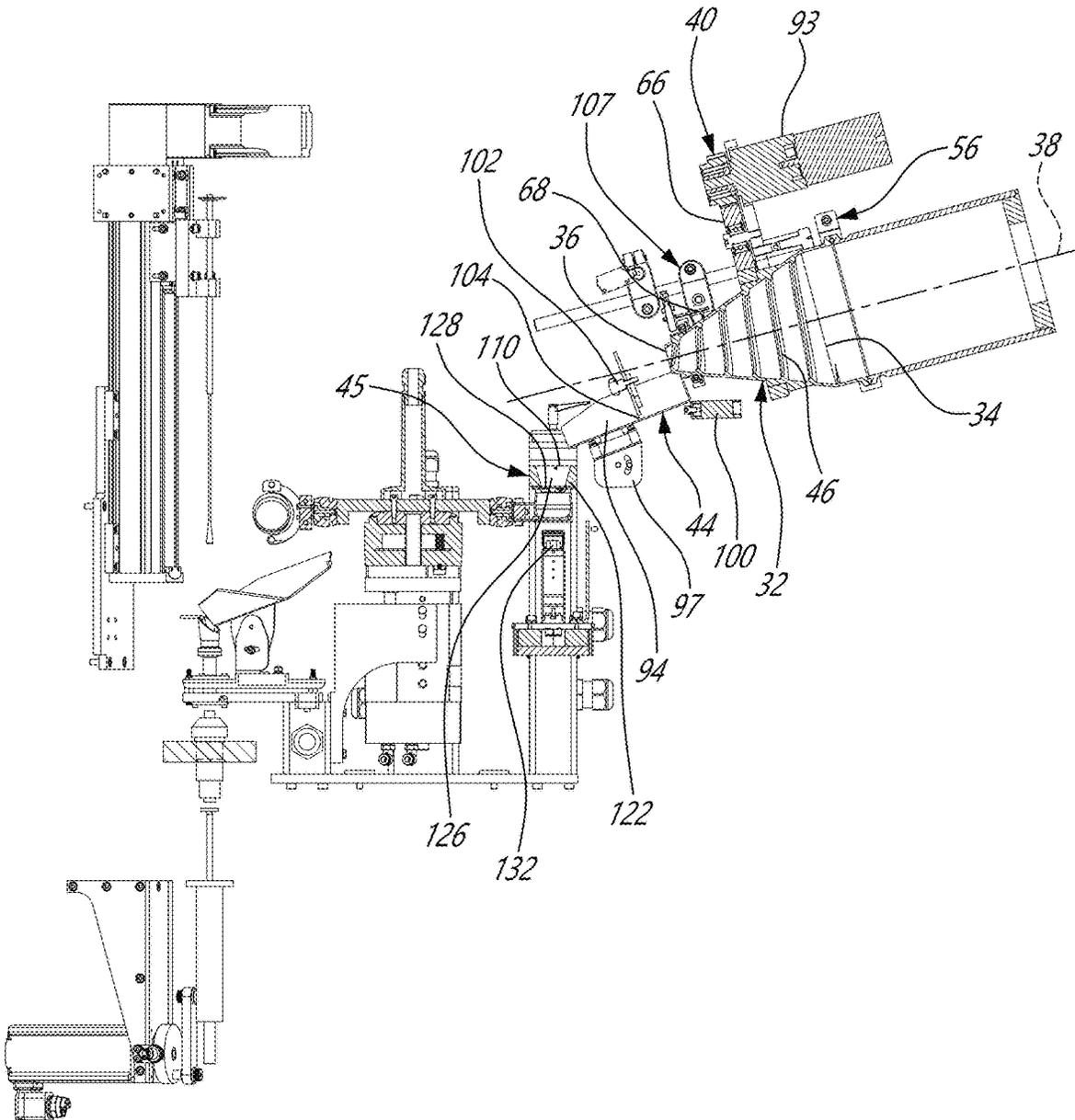


FIG. 3

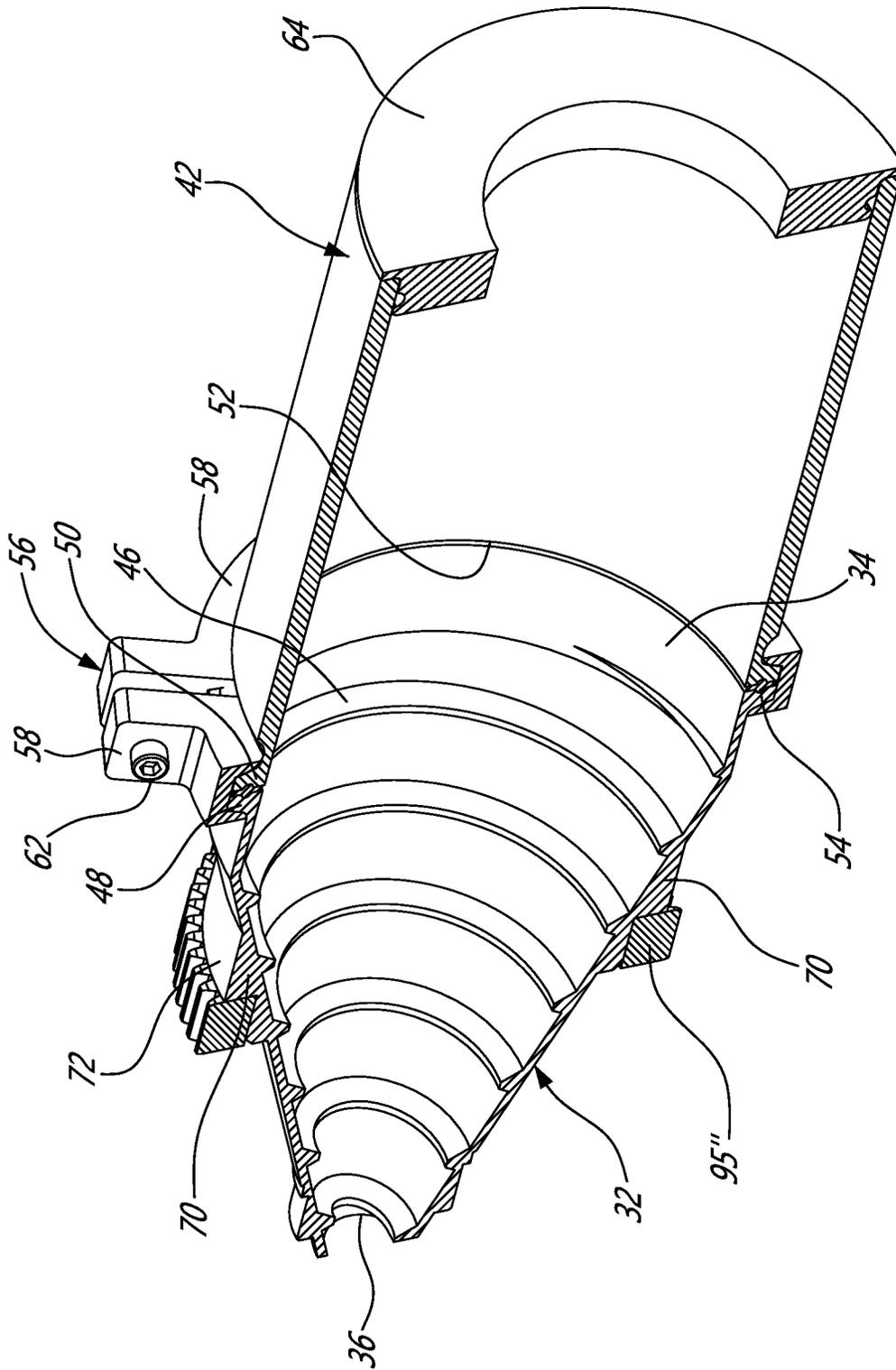
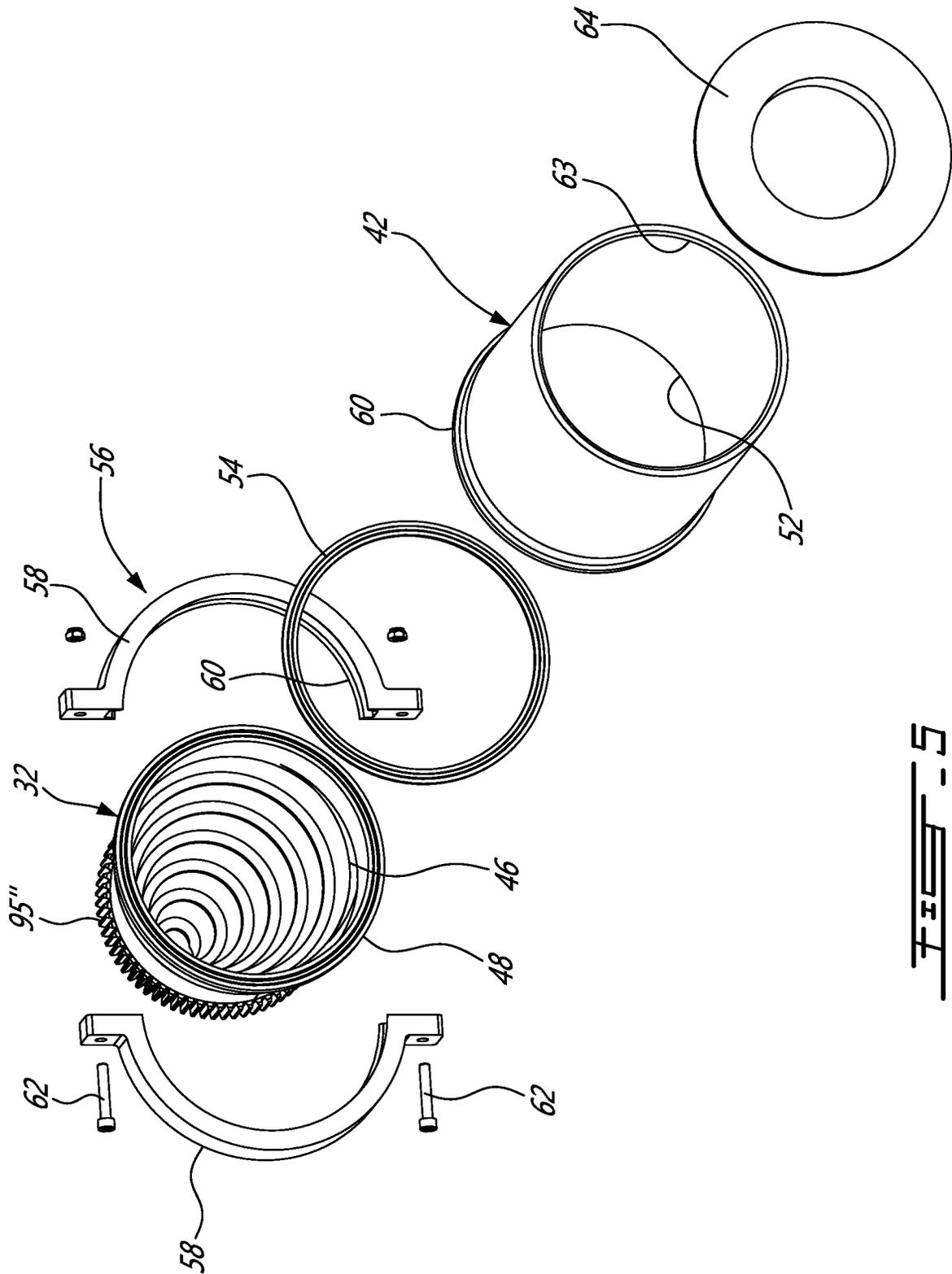


FIG. 4



**FIF - 5**

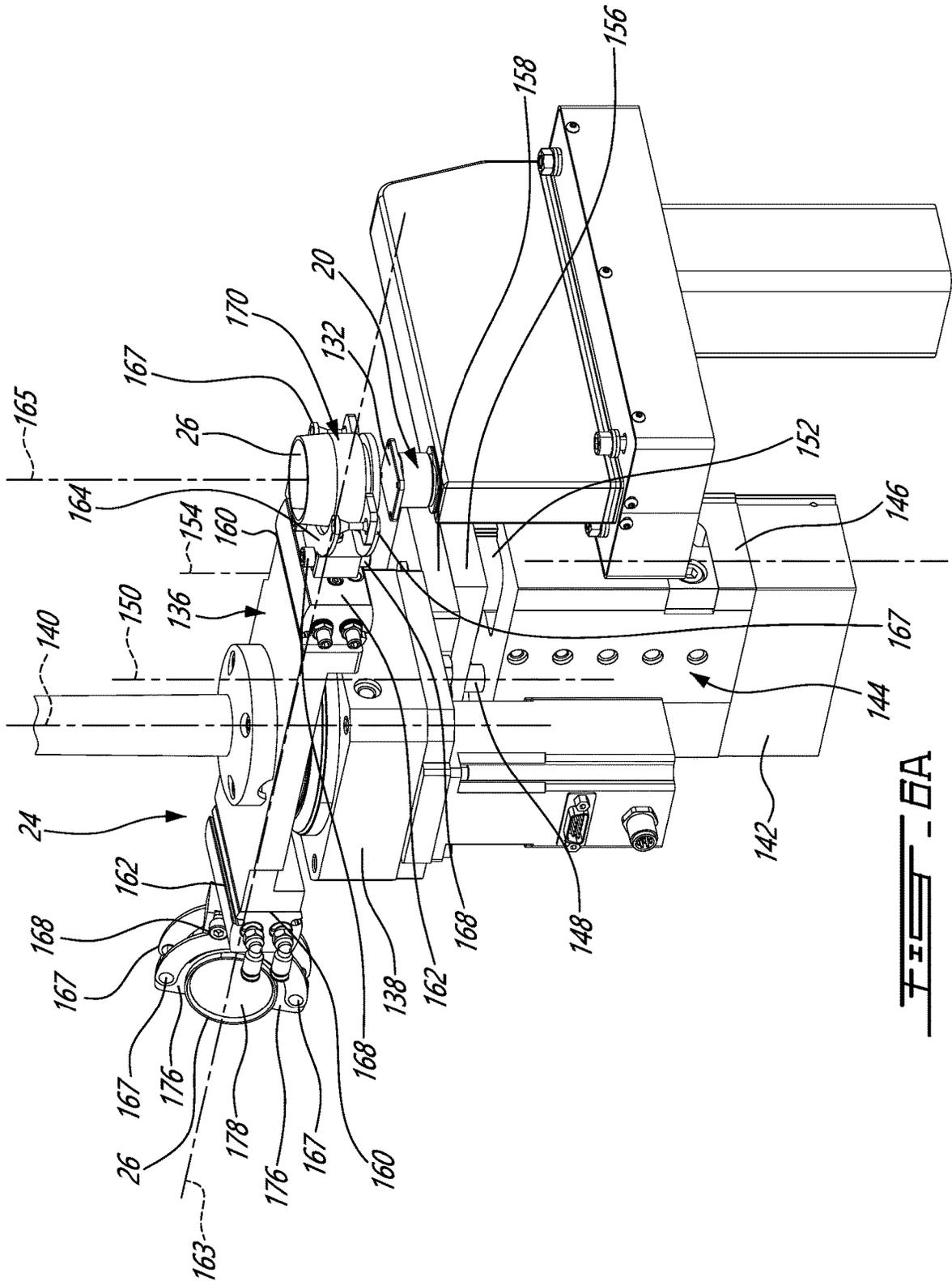


FIG. 6A

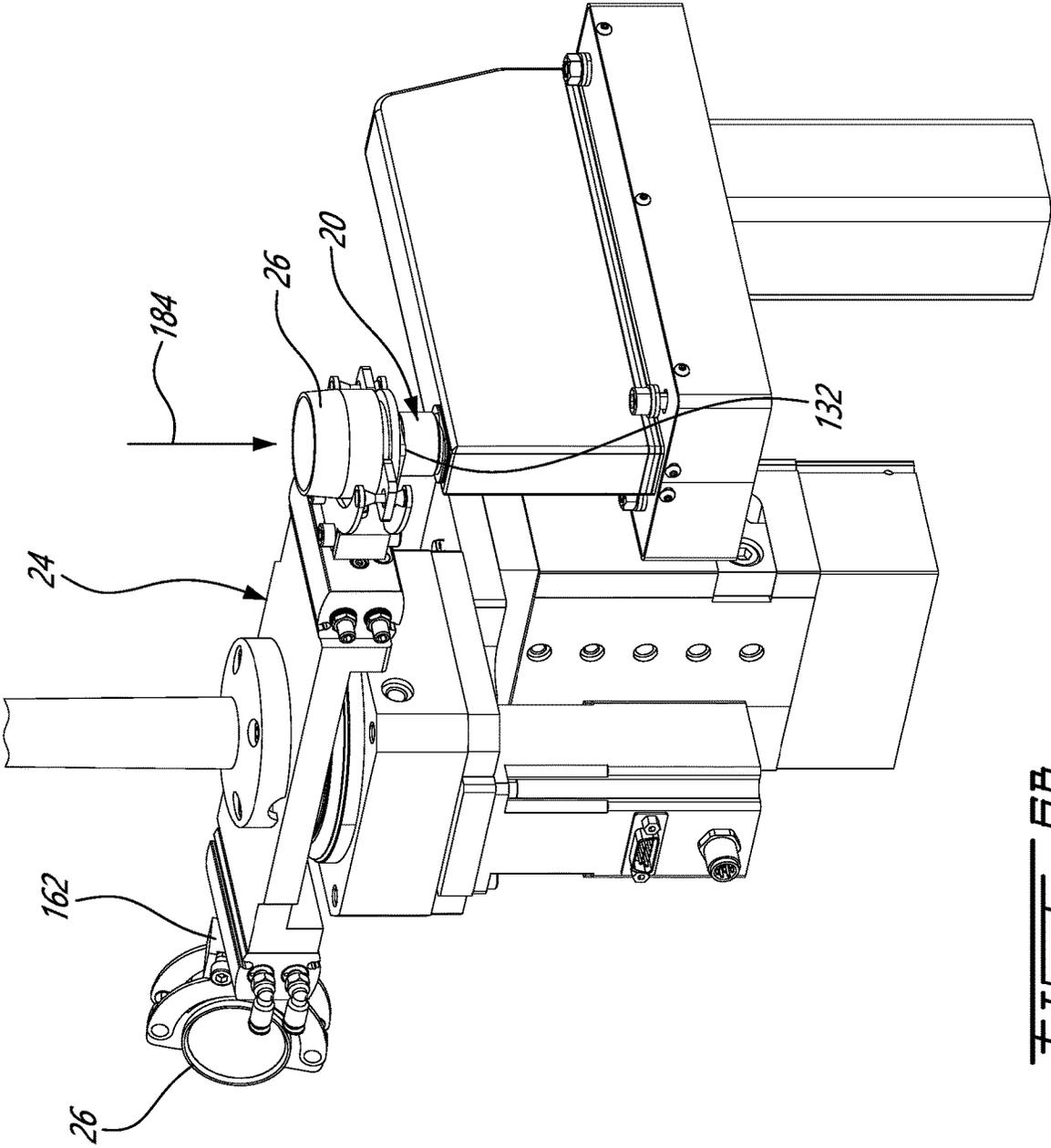


FIG. 6B

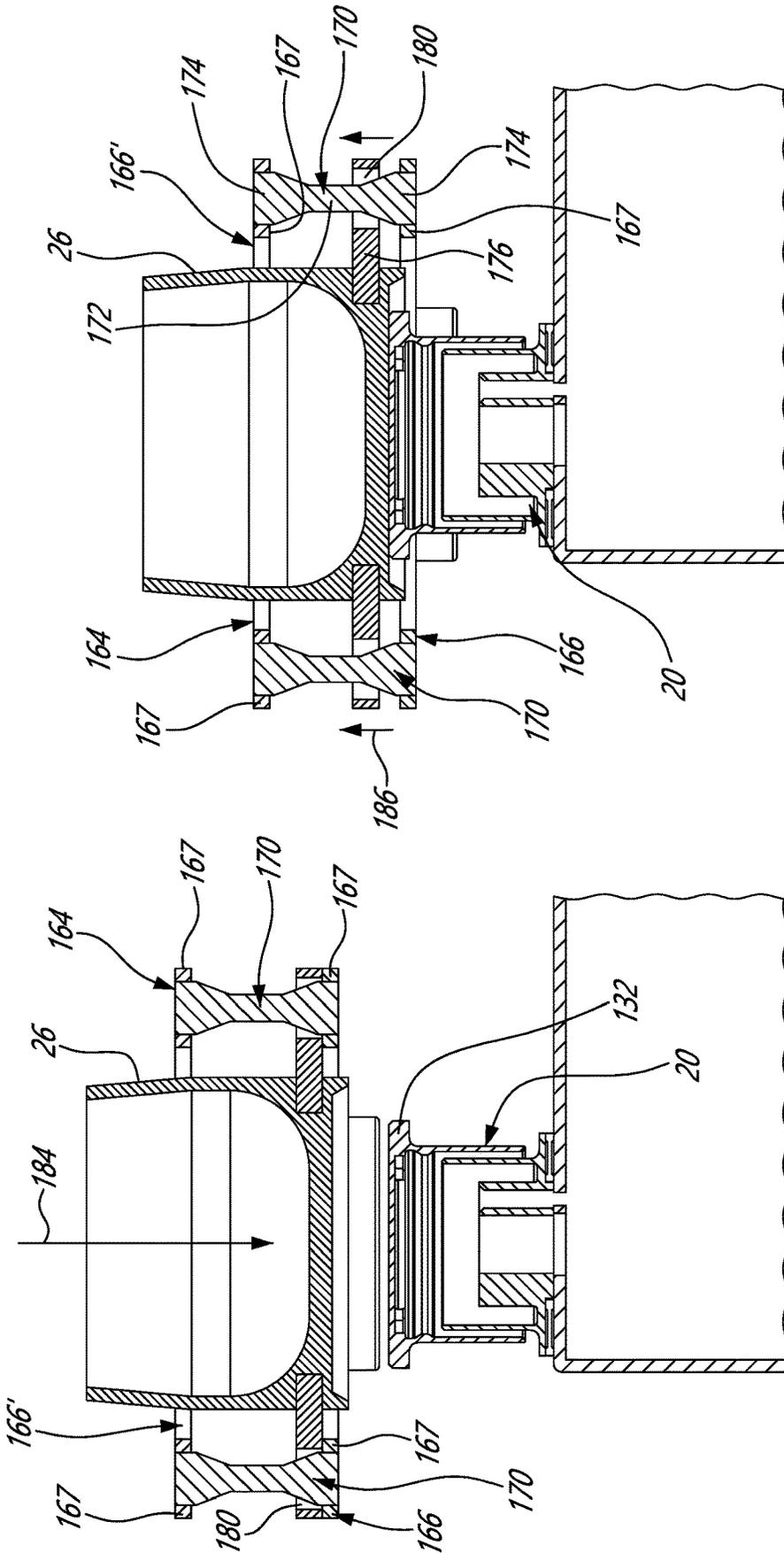
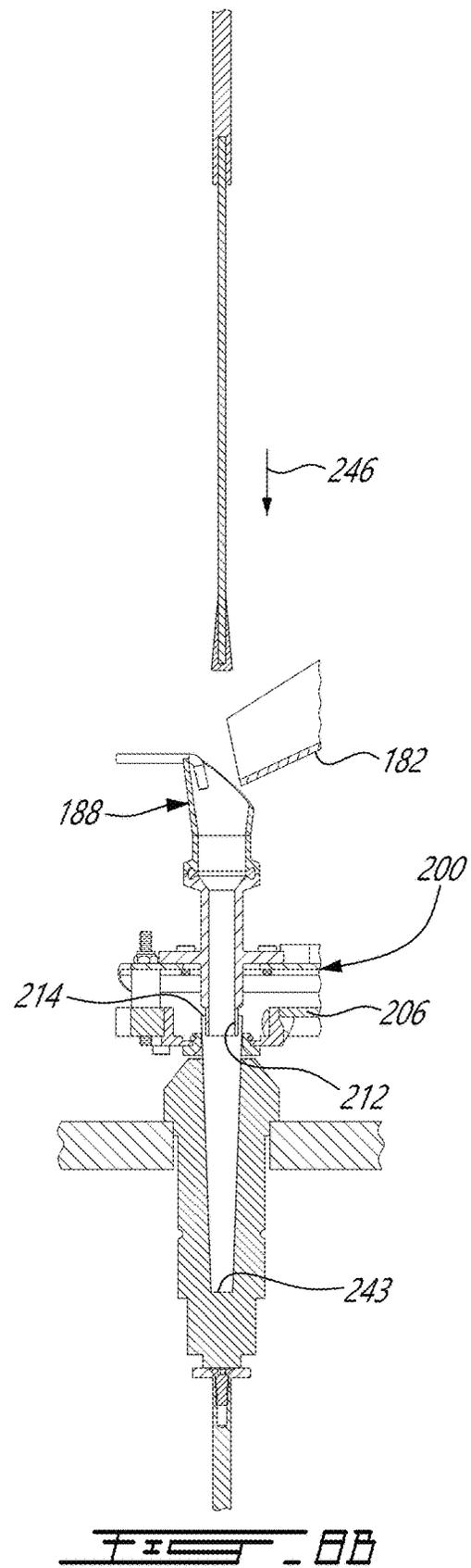
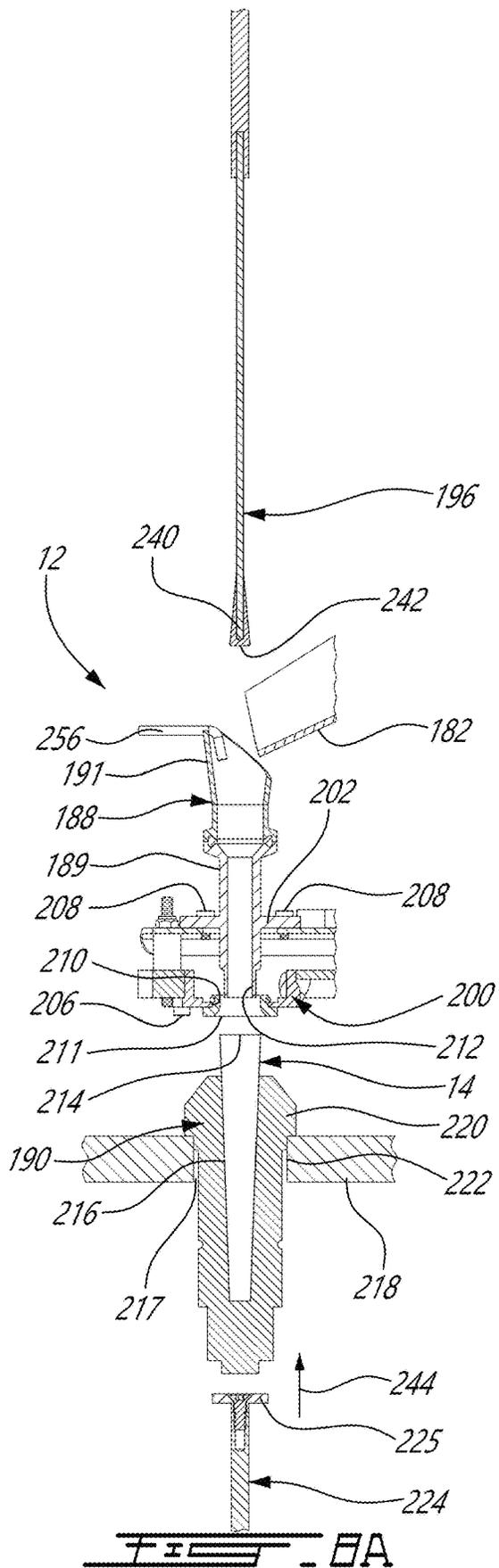
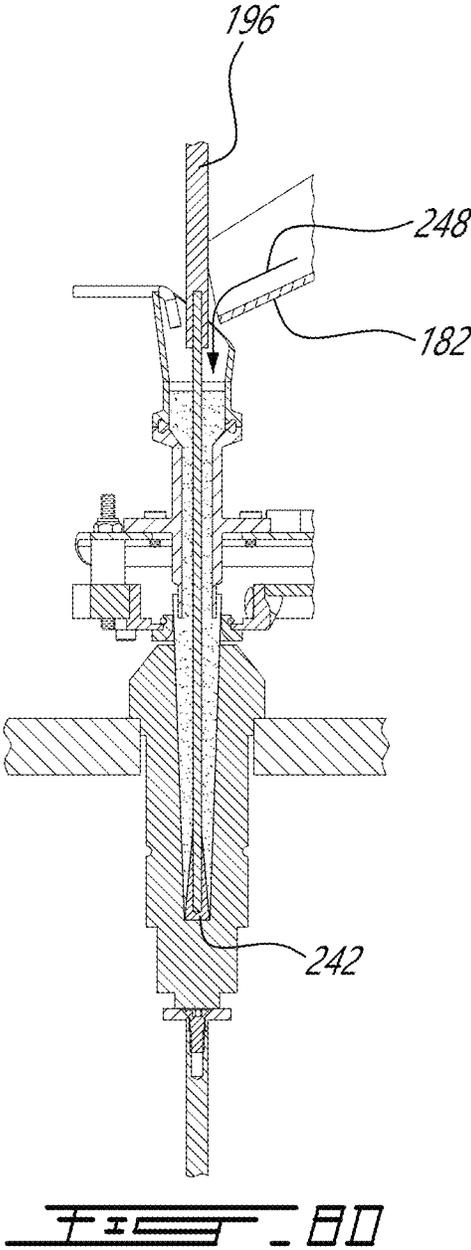
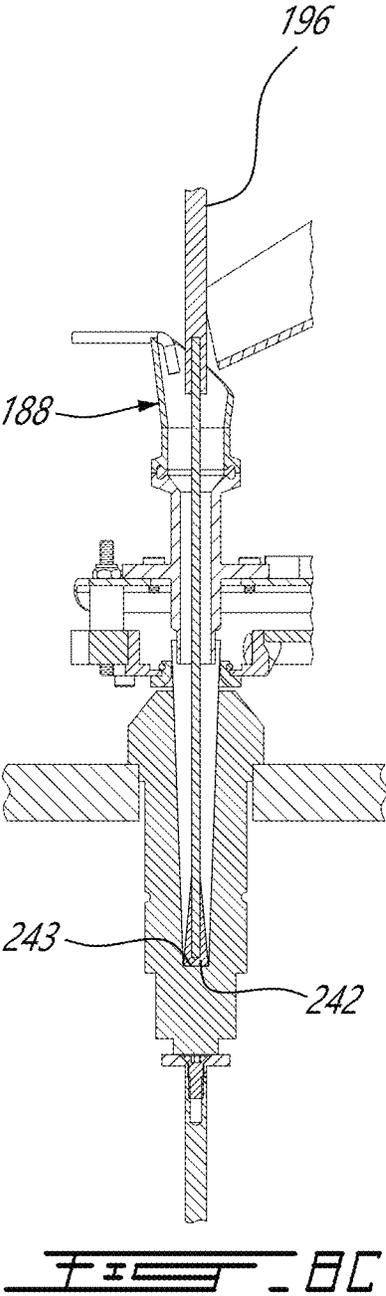


FIG. 7B

FIG. 7A





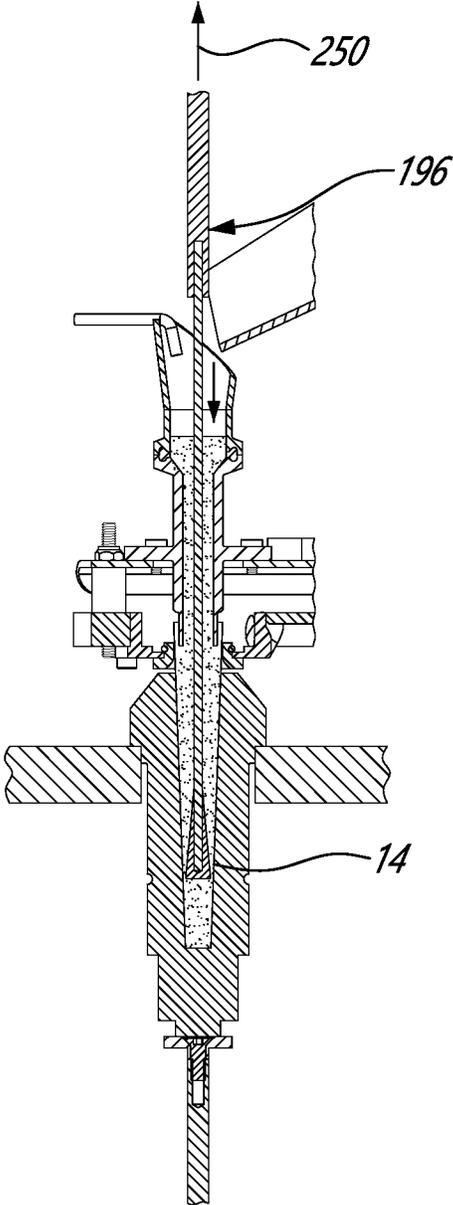


FIG. 2E

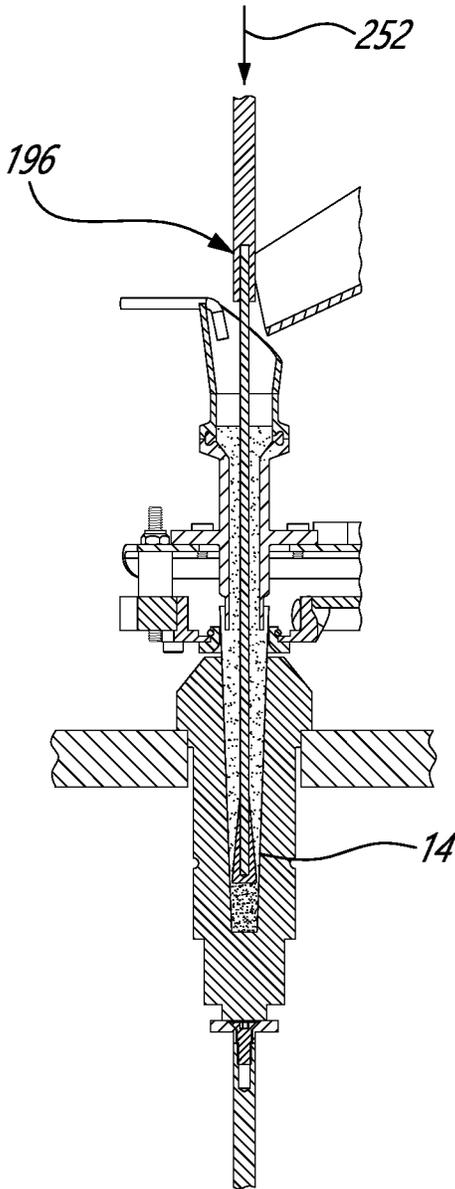


FIG. 2F

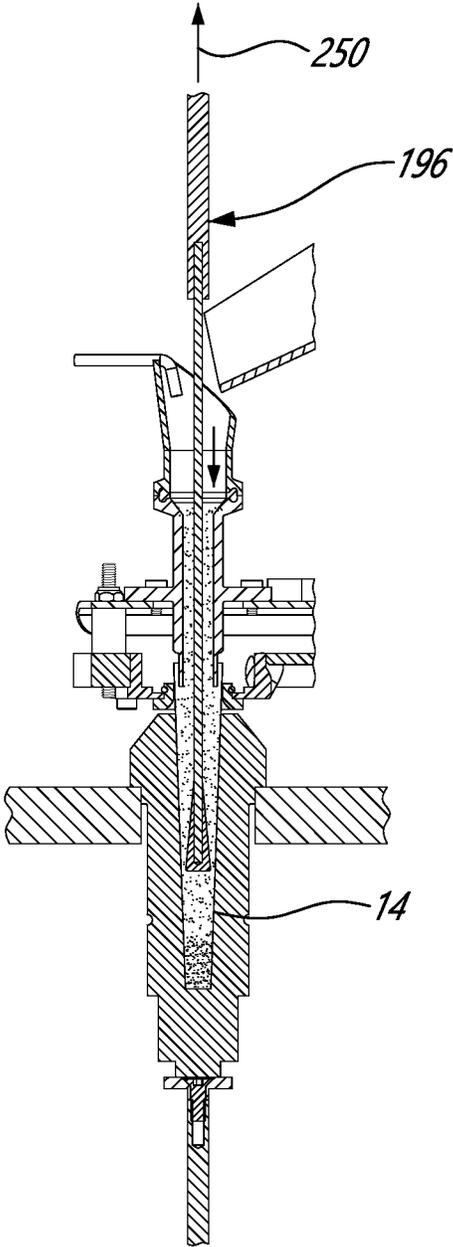


FIG. 8G

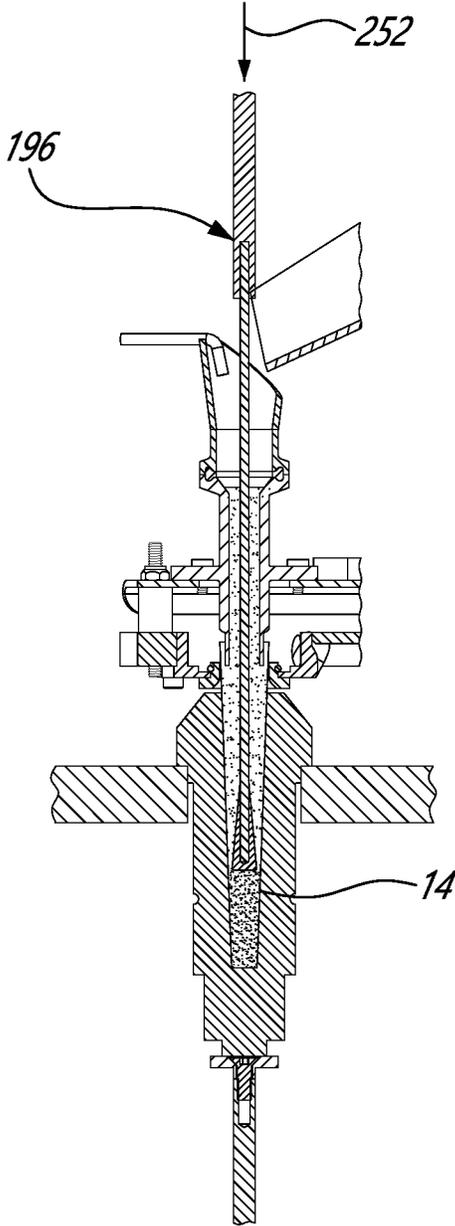


FIG. 8H

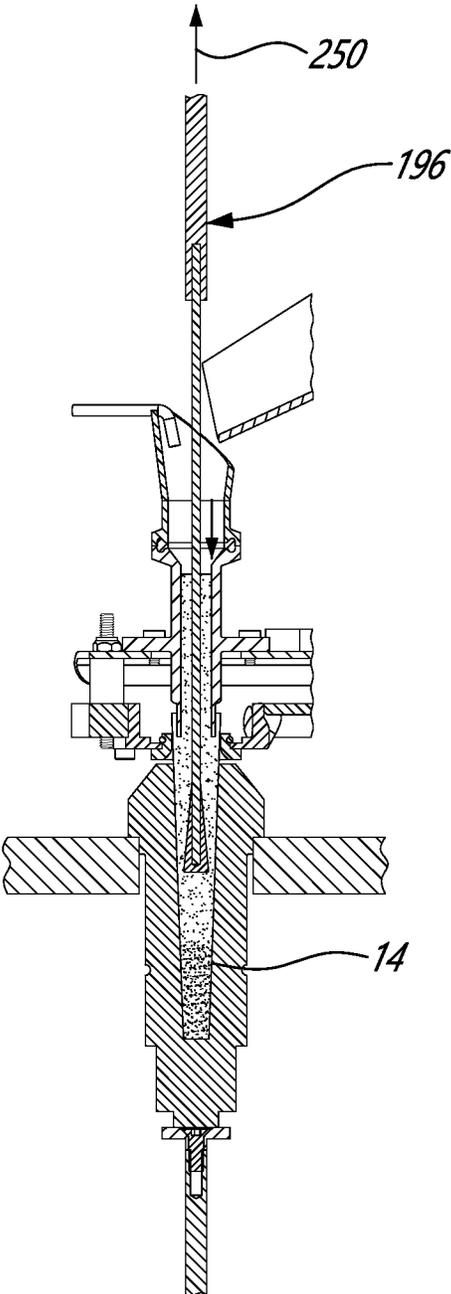


FIG. 8I

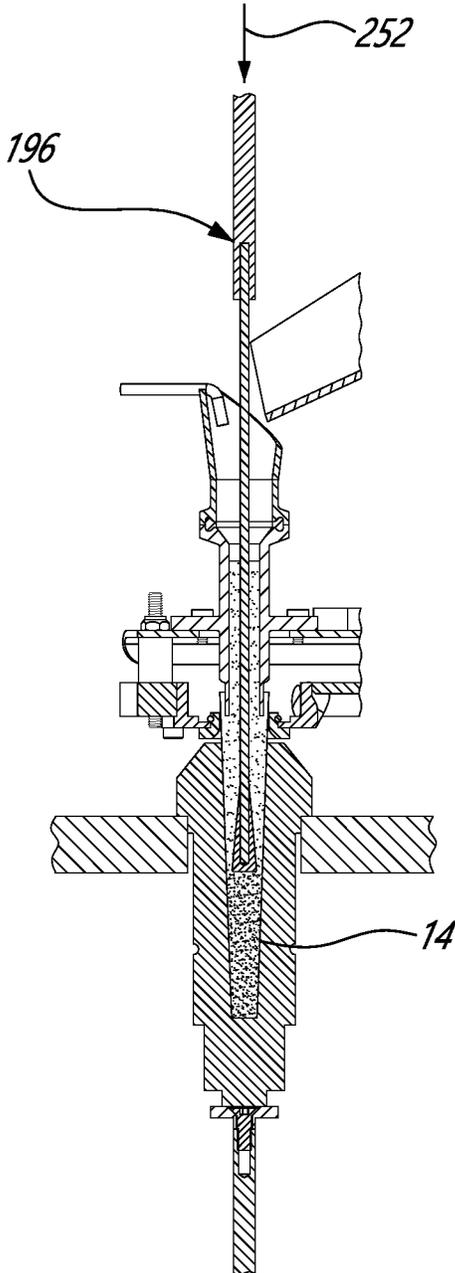
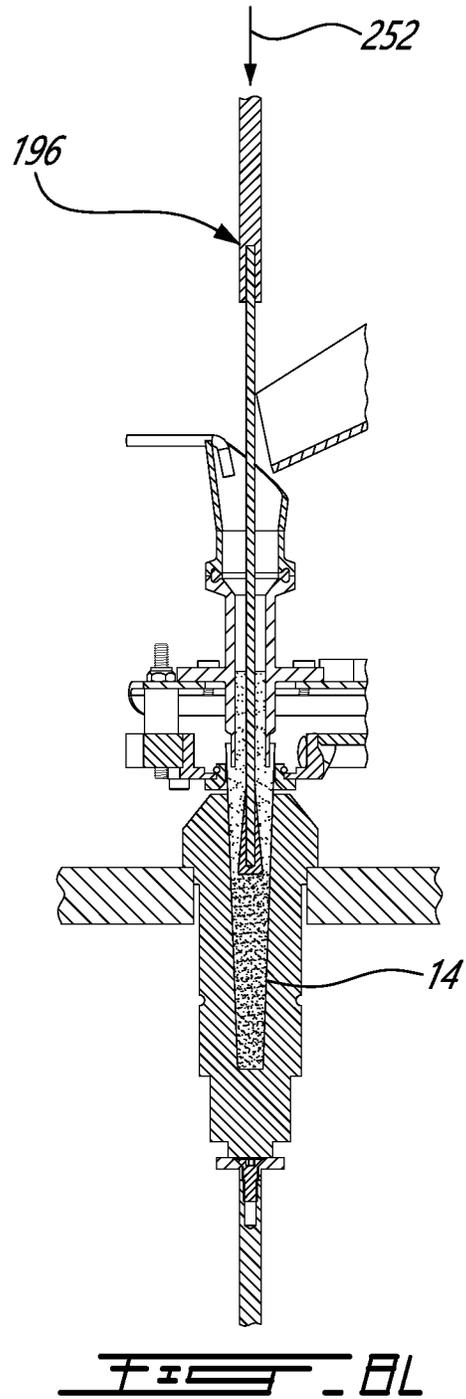
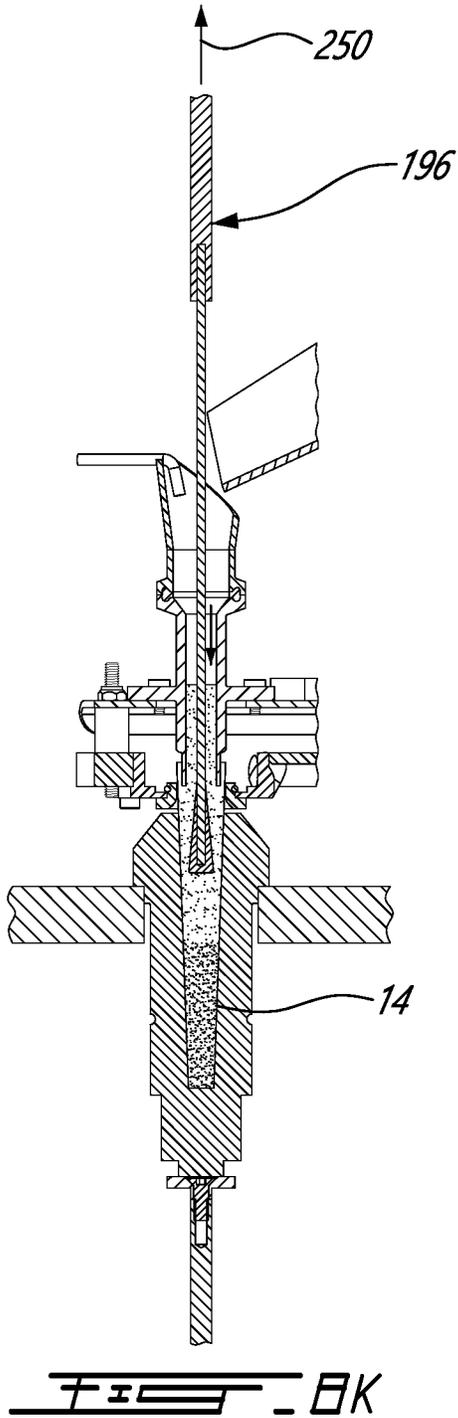


FIG. 8J



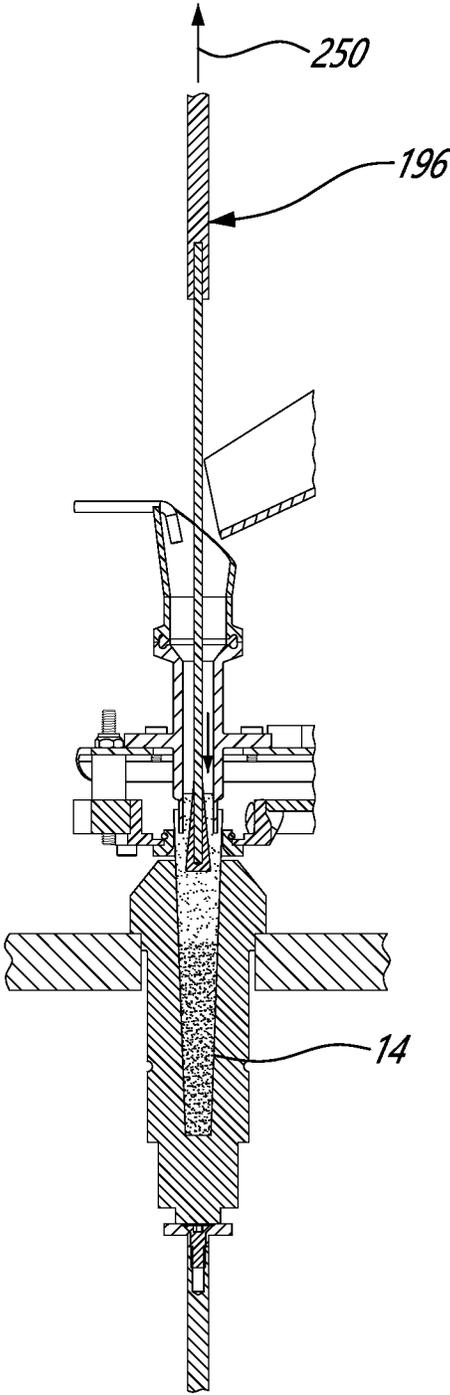


FIG. 8M

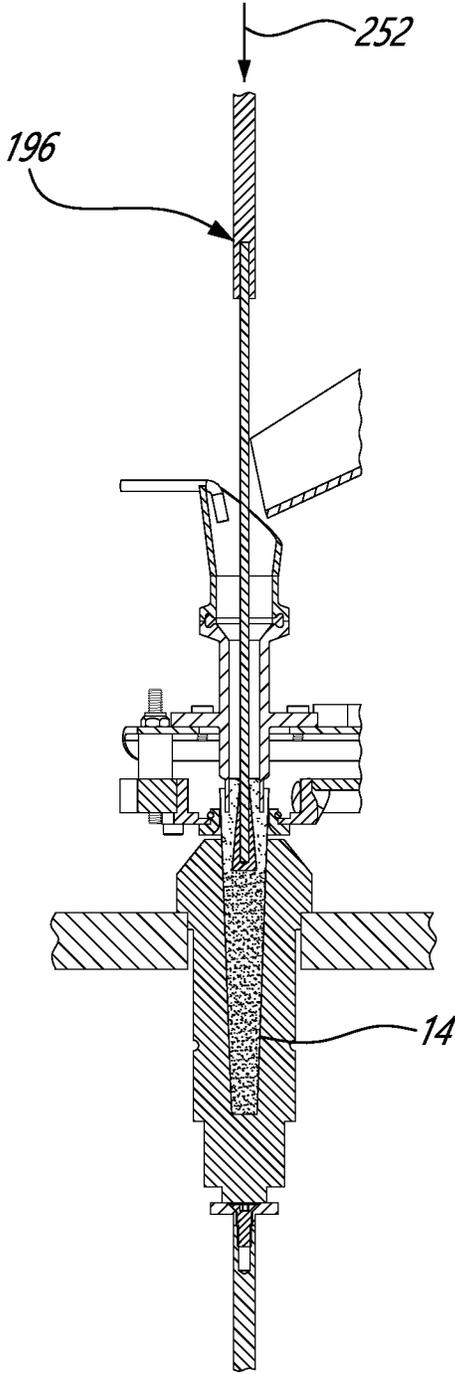


FIG. 8N

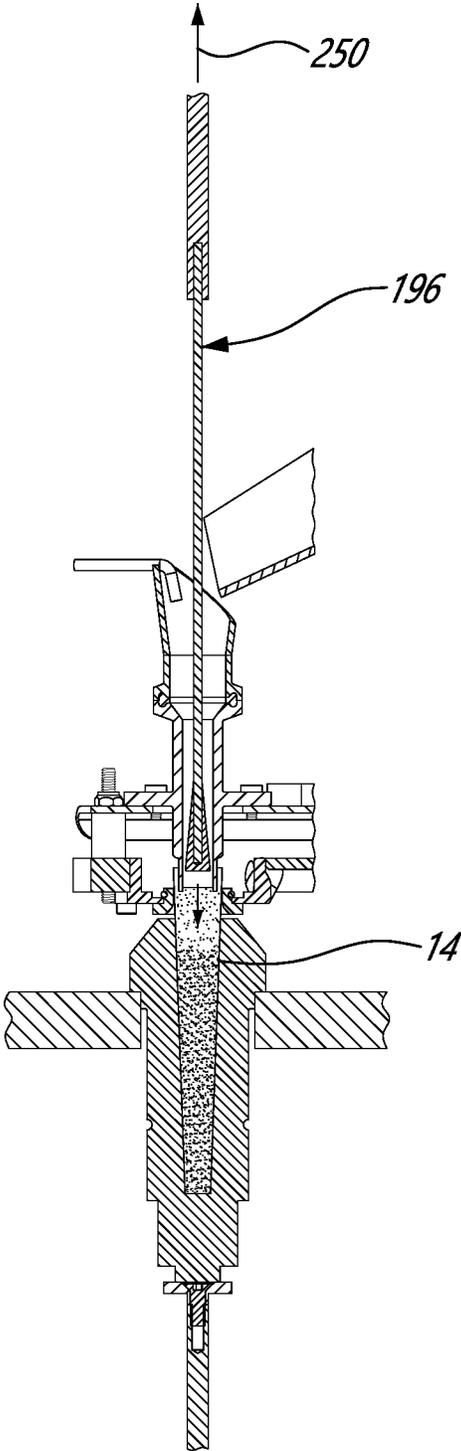


FIG. 80

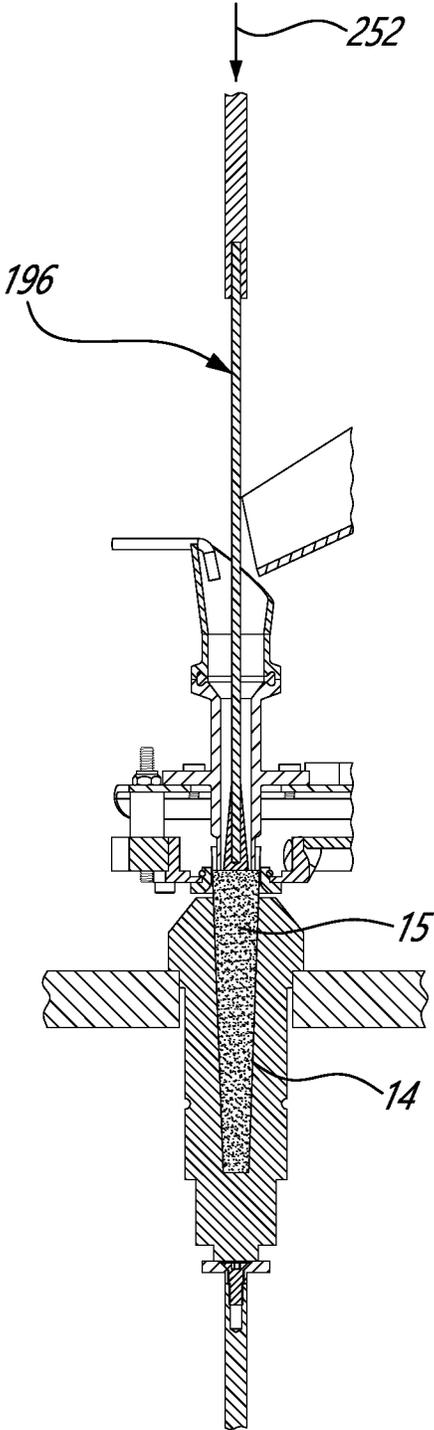
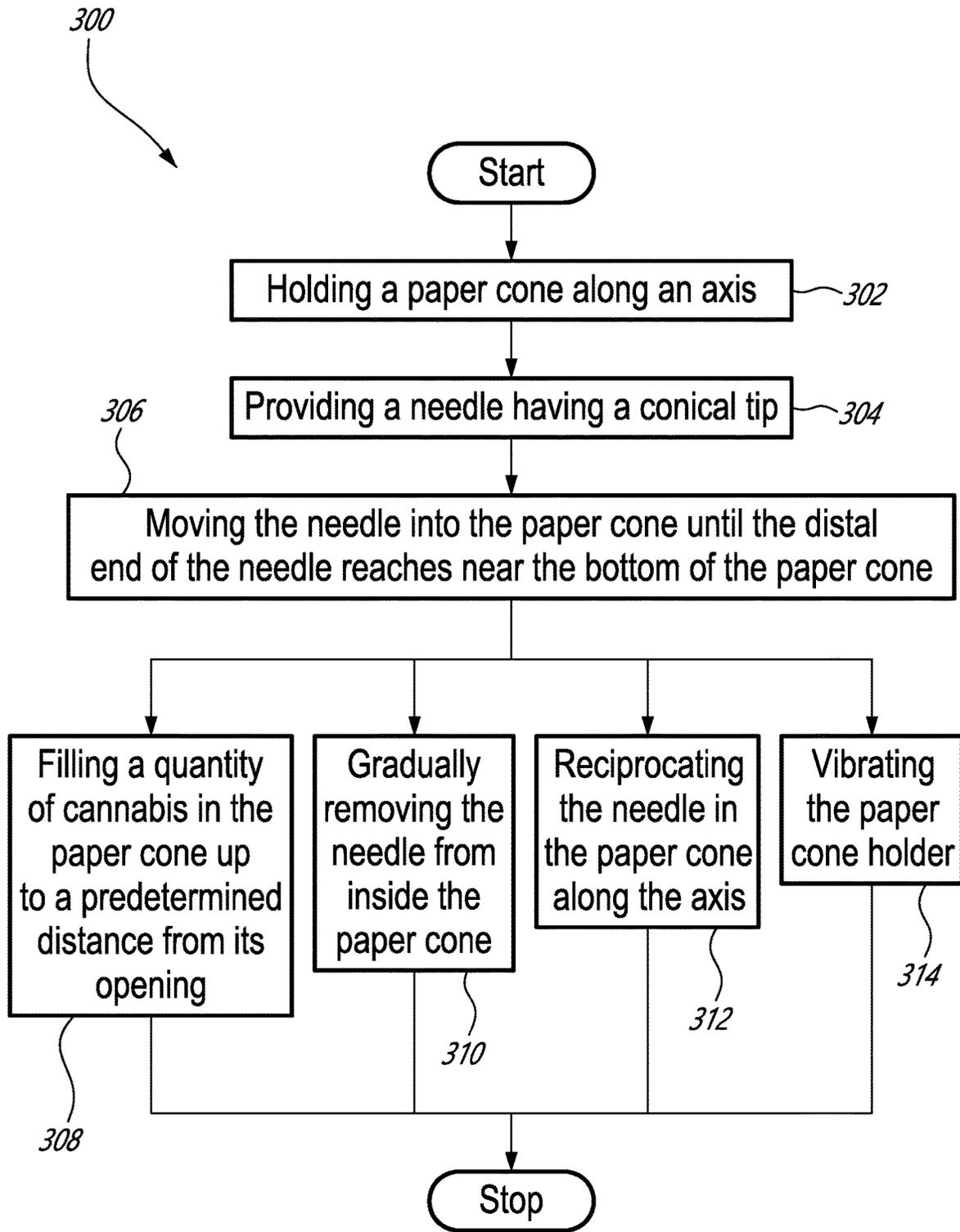


FIG. 81



CANNABIS JOINTS FILLING SYSTEM

FIELD

The present disclosure generally relates to cannabis joints and more specifically to a cannabis joints filling system.

BACKGROUND

Cannabis joints have long been and are still very often prepared by hands.

However, the legalization of cannabis in many territories have seen the coming of the automatization in the manufacturing of cannabis joint.

Some of the automated processes in the manufacturing of cannabis involve inserting paper cones in a cone holding tray and then vibrating the whole tray while it receives cannabis in bulk, the vibrations aiming at evening out the filling of the cones.

A drawback of such vibrating tray is that strong and moderate vibrations have been found to separate the delta-9-tetrahydrocannabinol (THC) from cannabis, thereby decreasing the quality of the product.

Another known automated process for the filling of cannabis includes literally injecting cannabis in each cone and then compacting the cannabis.

Drawbacks of such cannabis injection include separation of THC as described hereinabove and the lack of uniformity along the length of the cone considering its shape.

Also, known automated processes of filling cannabis in a paper cone are often imprecise in the quantity inserted in each cone.

BRIEF DESCRIPTION OF THE DRAWINGS

In the appended drawings:

FIG. 1 is a perspective view of a cannabis joints filling system according to a first illustrative embodiment;

FIG. 2 is a front view of the system from FIG. 1;

FIG. 3 is cross sectional front view of the system from FIG. 1;

FIG. 4 is a cross sectional perspective of the feeding rotary tumbler that is part of the cannabis feeding system shown in FIG. 1;

FIG. 5 is an exploded view of the feeding cone from FIG. 4;

FIGS. 6A and 6B are isolated perspective views of both a weighing scale and a single portion cannabis distributing device that is part of the cannabis joints filling system from FIG. 1, illustrating their operations while weighing a single dose of cannabis;

FIGS. 7A and 7B are cross-sections of one of the two cups of the single portion cannabis distributing device, corresponding respectively to FIGS. 6A and 6B;

FIGS. 8A to 8P are cross sections of parts of the cannabis joint filling apparatus, part of the system from FIG. 1; and

FIG. 9 is a flowchart of a method for pre-compacting cannabis in a paper cone.

SUMMARY

According to illustrative embodiments, there is provided a cannabis joints filling system comprising:

- a cannabis joint filling apparatus for receiving and holding a paper cone along a longitudinal axis and for receiving and pre-compacting a predetermined quantity of cannabis into the paper cone; and

- a cannabis feeding system including i) a weighing scale, ii) a cannabis feeding apparatus adjacent the weighing scale for receiving cannabis in bulk and for controllably outputting a predetermined portion of the cannabis in bulk onto the weighing scale, and iii) a device for distributing a single portion of cannabis, including two cups that are sequentially movable between a) a cannabis weighing position, wherein one of the two cups cooperates with the weighing scale to measure the predetermined portion of the cannabis, and b) a cannabis distributing position, where the predetermined portion of the cannabis is fed to the cannabis joint filling apparatus.

According to more specific illustrative embodiments, there is provided:

cannabis joints filling system comprising:

- a cannabis joint filling apparatus for receiving and holding a paper cone along a longitudinal axis and for receiving and pre-compacting a predetermined quantity of cannabis into the paper cone; the cannabis joint filling apparatus including i) a reciprocating needle mechanism including a needle, having a conical tip, and ii) an actuating mechanism to controllably cause the needle to reciprocate in the paper cone along the longitudinal axis while moving from a first position, wherein the conical tip is at a bottom of the paper cone, and a second position, wherein the conical tip is out of the paper cone; and

- a cannabis feeding system including i) a weighing scale, ii) a cannabis feeding apparatus adjacent the weighing scale for receiving cannabis in bulk and for controllably outputting a predetermined portion of the cannabis in bulk onto the weighing scale, and iii) a device for distributing a single portion of cannabis, including two cups that are sequentially movable between a) a cannabis weighing position, wherein one of the two cups cooperates with the weighing scale to measure the predetermined portion of the cannabis, and b) a cannabis distributing position, where the predetermined portion of the cannabis is fed to the cannabis joint filling apparatus;

wherein the cannabis feeding system includes:

- a support frame;
  - a feeding rotary tumbler defining a large inlet and a narrow outlet and that is mounted to the support frame for rotation about a rotational axis that is so angled relative to a horizontal axis that the inlet is higher than the outlet; the feeding cone having an inner surface and including a spiral shaped protrusion on the inner surface;
  - an actuating mechanism secured to the frame and operatively coupled to the feeding rotary tumbler for selectively causing the rotation of the feeding cone; and
  - a cone extension secured to the feeding cone at the inlet thereof so as to be in fluid communication therewith and defining a recipient to receive the cannabis in bulk; whereby, in operation, cannabis fed in bulk into the cone extension is brought by gravity and rotation to the inlet of the feeding rotary tumbler and then gradually moved from the inlet of the feeding cone to the outlet thereof by the spiral shaped protrusion when the feeding cone is caused to rotate by the actuating mechanism;
- wherein the device for distributing single portions of cannabis includes:
- a revolving support that is movable about a first axis; the revolving support being further movable between first and second position along the first axis;

3

first and second cup holders, each mounted to the revolving support for pivotal movement between a weighing position and a content-emptying position about a second axis that is perpendicular to the first axis, and

first and second cups, each mounted to a respective one of the first and second cup holders so as to be free to translate in and out of a position wherein the cup is supported by the cup holder

According to other illustrative embodiments, there is provided a cannabis feeding apparatus comprising:

a support frame;

a feeding rotary tumbler defining a large inlet and a narrow outlet and that is mounted to the support frame for rotation about a rotational axis that is so angled relative to a horizontal axis that the inlet is higher than the outlet; the feeding cone having an inner surface and including a spiral shaped protrusion on the inner surface;

an actuating mechanism secured to the frame and operatively coupled to the feeding cone for selectively causing the rotation of the feeding cone; and

a cone extension extending from the feeding cone at the inlet thereof so as to be in fluid communication therewith and defining a recipient to receive cannabis in bulk;

whereby, in operation, cannabis fed in bulk into the cone extension is brought by gravity and rotation to the inlet of the feeding cone, and then gradually moved from the inlet of the feeding cone to the outlet thereof by the spiral shaped protrusion when the feeding cone is caused to rotate by the actuating mechanism.

According to still another illustrative embodiment, there is provided a device for distributing single portions of cannabis, the device comprising:

a revolving support that is movable about a first axis; the revolving support being further movable between first and second position along the first axis;

first and second cup holders, each mounted to the revolving support for pivotal movement between a weighing position and a content-emptying position about a second axis that is perpendicular to the first axis, and

first and second cups, each mounted to a respective one of the first and second cup holders for free translation in and out of a position wherein the cup is supported by the cup holder.

According to another illustrative embodiment, there is provided a cannabis joint filling apparatus comprising:

a paper cone holder for receiving and holding a paper cone along a longitudinal axis; and

a needle, having a conical tip, that is reciprocable in the paper cone holder along the longitudinal axis while being gradually movable from a first position, wherein the conical tip is at the bottom of the paper cone holder, and a second position, wherein the conical tip is out of the paper cone holder; the conical tip being widest at a distal end thereof;

whereby, in operation, the needle reciprocating in the paper cone received in the paper cone holder while gradually and simultaneously i) moving from the first to the second positions, and ii) the paper cone receiving a predetermined portion of cannabis.

According to another illustrative embodiment, there is provided a method for pre-compacting cannabis in a paper cone, the method comprising:

holding a paper cone along a longitudinal axis; the paper cone having a bottom and an opening;

4

providing a needle having a conical tip; the conical tip having a widest portion at a distal end thereof that is dimensioned so as to snugly fit into the paper cone at the bottom thereof when inserted along the longitudinal axis;

moving the needle into the paper cone until the distal end of the needle reaches near the bottom of the paper cone; and

then simultaneously:

filling a quantity of cannabis in the paper cone so as to fill the paper cone up to a predetermined distance from the opening; and

gradually removing the needle from inside the paper cone; and

reciprocating the needle in the paper cone along the longitudinal axis;

whereby i) and ii) are so synchronized as to both end substantially simultaneously.

The expression cannabis should be construed herein

Other objects, advantages and features of the cannabis joints filling system will become more apparent upon reading the following non-restrictive description of illustrated embodiments thereof, given by way of example only with reference to the accompanying drawings.

#### DETAILED DESCRIPTION

In the following description, similar features in the drawings have been given similar reference numerals, and in order not to weigh down the figures, some elements are not referred to in some figures if they were already identified in a precedent figure. Herein, it shall further be noted that, for avoiding unnecessary details obscuring the invention, only device structures and/or processing steps closely relevant to schemes according to the invention are shown in the accompanying drawings while omitting other details less relevant to the invention.

The use of the word “a” or “an” when used in conjunction with the term “comprising” in the claims and/or the specification may mean “one”, but it is also consistent with the meaning of “one or more”, “at least one”, and “one or more than one”. Similarly, the word “another” may mean at least a second or more.

As used in this specification and claim(s), the words “comprising” (and any form of comprising, such as “comprise” and “comprises”), “having” (and any form of having, such as “have” and “has”), “including” (and any form of including, such as “include” and “includes”) or “containing” (and any form of containing, such as “contain” and “contains”), are inclusive or open-ended and do not exclude additional, un-recited elements.

A first illustrative embodiment of a cannabis joints filling system **10** will now be described with reference first to FIGS. **1** and **2**.

The cannabis joints filling system **10** comprises a cannabis joint filling apparatus **12** for receiving and holding a paper cone **14** along a longitudinal axis **16** and for receiving and pre-compacting a predetermined portion of cannabis therein (not shown), and a cannabis feeding system **18** for feeding the predetermined portion of cannabis to the cannabis joint filling apparatus **12**.

The predetermined portion of cannabis will also be referred to as a single dose **15** of cannabis **15** (see FIG. **8P**) and is a predetermined quantity of cannabis that is intended to fill a paper cone **14** to form a joint. Of course, such a single dose **15** may vary depending on the size of the paper cone **14** to fill.

The cannabis feeding system **18** comprises i) a weighing scale **20**, ii) a cannabis feeding apparatus **22**, adjacent the weighing scale **20**, for receiving cannabis in bulk (not shown) and for controllably outputting the cannabis onto the weighing scale **20**, and iii) a single portion cannabis distributing device **24** including two cups **26** that are sequentially movable between a cannabis weighing position, wherein one of the two cups **26** cooperates with the weighing scale **20** to measure the predetermined portion of the cannabis, and a cannabis distributing position, where the predetermined portion of the cannabis is fed to the cannabis joint filling apparatus **12**.

With references to FIGS. **1** and **3-5**, the cannabis feeding apparatus **22** will now be described in more detail.

The cannabis feeding apparatus **22** comprises a support frame **28** mounted to a height adjustment mechanism **30**, a feeding cone **32** defining a large inlet **34** and a narrow outlet **36** and that is mounted to the support frame **28** for rotation about a rotational axis **38**, an actuating mechanism **40** secured to the frame **28** and operatively coupled to the feeding cone **32** for selectively causing the rotation thereof about the axis **38**, a cone extension **42** secured to the feeding cone **32** at the inlet thereof **34** so as to be in fluid communication therewith, a chute **44** secured to the frame **28**, adjacent the feeding cone outlet **36**, so as to receive cannabis therefrom, and a controllable gate **45**.

The inner surface of the feeding cone **32** includes a spiral-shaped protrusion **46** thereon, which contributes to move cannabis precisely and gradually from the inlet **34** of the feeding cone **32** to the outlet **36** thereof when the feeding cone **32** is caused to rotate by the actuating mechanism **40**.

According to another embodiment, the cannabis feeding apparatus **22** is replaced by another apparatus or system allowing to receiving cannabis in bulk and to output a portion thereof to the weighing scale **20**.

As will be described hereinbelow in more detail, the cannabis feeding system **18** is further equipped with low and high-level sensors **106-106'** which allows detecting the flow of cannabis that exits the feeding cone **32**. This feature, in combination with the configuration of the feeding cone **32**, notably the spiral-shaped protrusion **46** therein allows optimizing the rotation of the feeding cone **32** to extract its content, which in turn minimizes both its energy consumption and its wear.

Compared to the use of a vibrating conveyor to bring cannabis into the filling system **12**, the use of the feeding cone **32** therefore allows an improved control on the cannabis flow into the system **10** and minimizes the aforementioned separation of the delta-9-tetrahydrocannabinol (THC) from cannabis, thereby improving the quality of the product.

The cone extension **42** has a diameter similar to the diameter of the feeding cone **32** at the inlet **34** thereof. Both the feeding cone **32** and the cone extension **42** include an outer flange **48** and **50** respectively at the inlet **34** and outlet **52** thereof. A cushioning washer ring **54** is provided between the feeding cone **32** and cone extension **42** and a clamp collar **56** is provided to secure the joint therebetween. The clamp collar **56** includes two identical complementary C-shaped parts **58**, each including a groove **60** therein to receive both flanges **48** and **50** and ring **54** in an abutting relationship. The two parts **58** attach the cone extension **42** to the feeding cone **32** when they are assembled thereon using fasteners **62**.

According to another embodiment (not shown), the cone extension is detachably or permanently attached to the feeding cone **32** using another attachment than a clamp

collar **56**. According to still another embodiment, the cone extension **42** is integral to the feeding cone **32**.

The inlet **63** of the cone extension **42** is provided with an inward flange **64** that defines an opening thereof that is narrower than its outer diameter.

The cone extension **42** defines a container to receive cannabis in bulk.

It is to be noted that the sizes and configurations of the feeding cone **32** and cone extension **42** may be different than illustrated so as to be adapted for the grade or quantity of cannabis.

The support frame **28** includes a first plate **66** having a circular opening **68** that receives the feeding cone **32** for free rotation therein. For that purpose, the feeding cone **32** is provided with a collar portion **70** extending outwardly therefrom and which includes an annular section **72** that is shaped to be complementary received within the opening **68**.

The support frame **28** further includes a generally L-shaped mounting assembly **74** that mounts the first plate **66** to the height adjustment mechanism **30**. More specifically, the mounting assembly **74** includes a second plate **76** that fixedly receives the first plate **66** using fasteners **78**, and a generally L-shaped member **80** including a third plate **82** that receives the second plate **76** on a first lateral side thereof, and an anchor portion **84** that extends from the third plate **82**, generally perpendicular therefrom on a second lateral side thereof.

The anchor portion **84** is fixedly mounted to the height adjustment mechanism **30** using fasteners **78**.

The third plate **82** includes grooves **86-92** that allows mounting the second plate via fasteners **78** in a manner that allows adjusting the angle of the second plate **76** and therefore of the axis **38** relative to the horizontal.

The support frame **28** can have another configuration than illustrated. According to another embodiment (not shown), the height adjustment mechanism **30** is omitted and or the support frame **28** has fixed configuration that yields a fixed angle of the axis **38** relative to the horizontal.

Since the height adjustment mechanism **30** are believed to be well-known in the art, it will not be described herein in more detail for concision purposes.

The actuating mechanism **40** includes a rotary actuator **93** secured to the first plate **66** on a first side face thereof, and a transmission mechanism, in the form of a gear assembly **95**, rotatably coupling the feeding cone **32** to the actuator **93**. The gear assembly **95** includes a first gear **95'** secured to the actuator **93**, coaxially to the output thereof, a second gear **95''** fixedly mounted to the feeding cone **32** on its outer surface coaxially thereto, and a third gear **95'''** rotatably mounted to first plate **66** so as to rotatably couple the first and second gears **95'** and **95''**. The gear assembly **95** is on the second side face of the first plate.

According to another embodiment (not shown), the gear assembly is differently configured to transmit the rotational movement of the actuator **93** to the feeding cone **32**. According to still another embodiment (not shown), the transmission mechanism takes another form than a gear assembly **95**.

The chute **44** includes a V-shaped channel **94** that is mounted to the support frame **28** so as to be positioned at the outlet **36** of the feeding cone **32**, operatively below thereof so as to receive cannabis therefrom. The V-shaped channel **94** is positioned between the feeding cone **32** and the weighing scale **20**. The V-shaped channel **94** is further slanted similarly to the feeding cone **32** so as to define a smooth continuity thereof.

The support frame **28** further includes an L-shaped mounting assembly **96** that extends from the anchor portion **84** thereof.

The chute **44** further includes a tilting bracket **97** that is mounted at the distal end **98** of the L-shaped mounting assembly **96** and that allows adjusting the angle of the channel **94**, and a pneumatic vibrator **100** that is provided to induce vibration selectively and controllably onto the V-shaped channel **94** to reduce friction of the cannabis thereon and hence promote its flow between the feeding cone **32** and the weighing scale **20**.

The chute **44** further includes a flow restrainer **102** that is mounted to the V-shaped channel **94** therein. The flow restrainer **102** is in the form of a plate that is so configured as to define a partial stopper within the channel **94**, which defines therewith a small opening **104** that aims at limiting the flow of cannabis on the chute **44**.

The vibrator **100** is controlled so as induce onto the channel **94** stronger vibrations at first, and then gradually fainter vibrations. This mode of operation of the vibrator **100** aims at rapidly moving a major portion of the predetermined single dose **15** of cannabis from the feeding cone **32** to the weighing scale **20** and then gradually diminishing the flow of cannabis so as to increase the weighing precision.

The vibrator **100** is not limited to the illustrated embodiment and can also be, for example, of the electric type. Since a vibrator **100** is believed to be well-known in the art, it will not be described herein in more detail.

According to another embodiment (not shown), the vibrator **100** can be operated according to another mode. According to still another embodiment (not shown), the vibrator **100** is omitted or replaced by another mechanism or system allowing to promote the flow of cannabis between the feeding cone **32** and weighing scale **20**.

The cannabis feeding system **18** is further equipped with low and high-level sensors **106-106'**, which are mounted side-by-side to the support frame **28** via an adjustable mounting assembly **108** so as to have a line of sight to the first chute **44**. The sensors **106-106'** are in the form of two identical laser detectors, the first one configured to detect a predetermined low level of cannabis onto the chute **44** and the other to detect a predetermined high level thereof.

When the sensors **106-106'** detect that the flow of cannabis onto the channel **94** is reduced or absent, the actuator **40** is energized to rotate the feeding cone a predetermined amount to allow more cannabis towards the weighing scale **20** via the chute **44** and through the gate **45**.

The controllable gate **45** includes a recipient **110** that is positioned above the weighing scale **20** by an L-shaped mounting assembly **112**, which includes a post **114** and an arm **116** having first and second longitudinal ends **118-120** and being secured to the post **114** near its first longitudinal end **118** so as to extend generally perpendicularly therefrom towards the weighing scale **20**. The recipient **110** includes a container portion **122** and a L-shaped mounting portion **124** that extends from the container portion **122** and that is secured to the arm **116** at the second longitudinal end **120** thereof.

The container portion **122** includes a frusto-conical opening **126** that defines a gradually narrowing passage from the V-shaped channel **94** towards the weighing scale **20**.

The container **122** further includes a bottom **128** that is slidable between a first position, which closes the opening **126**, and a second position, which completely frees the opening **126**. For that purpose, the controllable gate **45**

further includes a linear actuator **130** that is mounted to the arm **116** thereunder and that is operatively coupled to the bottom **128**.

In operation, the controllable gate **45** is operated to allow passage of cannabis from the feeding cone **32**, through the V-shaped channel **94**, onto the weighing scale **20** until a predetermined amount of cannabis is weighed thereon. The controllable gate **45** is then closed to stop additional cannabis from reaching the scale **20**, until the predetermined amount of cannabis is moved to the cannabis joint feeding apparatus **12** by the single portion cannabis distributing device **24** as will be described hereinbelow in more detail. This predetermined amount of cannabis will also be referred to as a single dose of cannabis **15**, which is to be filled into each paper cone **14**.

It is to be noted that the controllable gate **45** can have another form than illustrated hereinabove. For example, the configuration and size of the recipient **110**, mounting assembly **112** and/or actuator **130** can be different.

The weighing scale **20** is an electronic analytical-type scale that includes a plate **132** that is configured and positioned to operatively receive a cup **26** from the single portion cannabis distributing device **24** as will be described hereinbelow in more detail. The weighing scale **20** allows measuring weight as low as 0.001 g. According to the illustrated embodiment, the weighing scale **20** is configured to measure a single dose of cannabis of 0.25 g with a tolerance of 5 percent but can be configured to measure another quantity of cannabis within a different tolerance.

The weighing scale **20** and controllable gate **45** are both secured to a same base **134**.

Since an electronic analytical-type scale is believed to be well-known in the art, it will not be described herein in more detail for concision purposes.

The cannabis feeding system **18** is not limited to include an electronic analytical type weighing scale and can be equipped with another type of weighing scale.

The single portion cannabis distributing device **24** will now be described in more detail with reference first to FIG. **6A**.

The single portion cannabis distributing device **24** comprises a turntable **136** that is mounted to a primary support base in the form of a gearbox **138** for rotational movement about a rotational axis **140**. The distributing device **24** further comprises a secondary support base **142** that receives the primary support base **138** via a linear actuator **144** for reciprocal movement of the primary support base **138** relative to the secondary support base **142** along the rotational axis **140**.

More specifically, the linear actuator **144** includes a guide body **146** that is fixedly sat onto the secondary support base **142**, a thrust rod **148** that is slidably mounted in the guide body **146** so as to be movable along an axis **150** that is parallel to the axis **140**, a sliding support column **152** that is slidably mounted in the guide body **146** for reciprocal movement along an axis **154** parallel to both axes **140** and **150**, and a runner plate **156** secured to both the rod **148** and column **152** for reciprocal movement in unison with both rod **148** and column **152**.

The primary support base **138** is fixedly sat onto the plate **156** via a spacer plate **158** for reciprocal movement in unison with the plate **156**. It results that from the above-described assembly that the turntable **136** is also mounted to the secondary support base **142** for reciprocal movement along the rotational axis **140** in addition to being rotatable thereabout.

The two cups **26** are each mounted to a respective lateral side **160** of the turntable **136** via a rotary actuator **162** for pivotal movement about a pivot axis **163** between a first position, wherein the cup **26** is right side up (see the right cup **26** on FIG. 6A), and a second position, wherein the cup **26** is tilted more than ninety (90) degrees, which causes the cup **26** to be emptied of its content (see the left cup **26** on FIG. 6A).

Each cup **26** is mounted to a respective rotary actuator **162** via a mounting bracket **164** for further free sliding movement along an axis **165** that is perpendicular to the pivot axis **163**.

With references to FIGS. 6A and 7A and 7B, the mounting bracket **164** will now be described in more detail.

Each mounting bracket **164** includes two small C-shaped plates **166-166'**, each having a middle section and two free ends **167**. The C-shaped plates **166-166'** are fixedly mounted to the rotary actuator **162** through their middle section using fasteners **168** to be generally parallel one from the other. The pair of C-shaped plates **166-166'** are further joined at their facing free ends **167** by spacers **170**. The spacers **170** have a narrow middle section **172** and two gradually larger ends **174**.

Each of the cups **26** is provided with two fins **176** that extend on diametrically opposite sides thereof, near its bottom **178**. Each fin **176** is provided with a hole **180** that receives the spacers **174** therein. The diameter of the hole **180** is dimensioned for receiving the larger ends **174** of the spacers **170** in a snugly-fit manner.

As can be seen in FIG. 7A, each cup **26** is mounted to a respective rotary actuator **162** for free movement between a first rested position, wherein the fins **176** sits on the lower C-shaped plate **166**, and a second raised position, wherein the fins **176** abuts the higher C-shaped plate **166'** from below. The rested position is naturally reached under the combined force of gravity and rotation when the rotary actuator **162** is in its first position.

The operation of the single portion cannabis distributing device **24** will now be described with references to FIGS. 6B and 7A-7B.

The cup **26** that is on the side of the weighing scale is first moved in its first position, wherein the cup **26** is right side up (see FIGS. 6B and 7A). While in this position, one of its cups **26** is positioned above the weighing scale **20** and coaxially therewith.

As can be seen in FIGS. 1 and 6B, also while in this position of the distributing device **24**, the cup **26** that is on the side of the cannabis joint filling apparatus **12** is first positioned above a second chute **182** that is part of the cannabis joint filling system **12**, and then tilted by the rotary actuator **162** into its second position so as to drop its content onto the second chute **182**. The emptying of the right-side cup **26** into the cannabis joint filling apparatus **12** is therefore performed simultaneously to the weighing of the right-side cup **26** as will now be described in more detail.

The turntable **136** is lowered (see arrow **184** on both FIGS. 6B and 7A) until the right-side cup **26** rests onto the plate **132** of the scale **20**. As can be better seen in FIG. 7B, the fins **176** of the cup **26** are then moved from its first rested position towards its second raised position (see arrow **186** on FIG. 7B). It is to be noted that the weighing scale **20** is calibrated to take into account the weight of the empty cup **26** when measuring a predetermined single portion of cannabis.

With references briefly to FIGS. 1 to 3, and as described hereinabove, cannabis in bulk is precisely moved from the cone extension **42** to the cup **26** that has been moved

adjacent thereto until the predetermined single portion thereof has been transferred. The controllable gate **45** is then closed and the single portion cannabis distributing device **24** is energized so that the two cups **26** are switched between the cannabis weighing position and the cannabis distributing position. This cycle is repeated indefinitely during the cannabis joint filling process.

According to another embodiment (not shown), another mechanism than the turntable **136** is used to move a cup **26** from a cannabis filling and weighing position to a cannabis joint filling position.

With references now to FIGS. 1, 2 and 8A, the cannabis joint filling apparatus **12** will now be described in more detail.

The apparatus **12** comprises a funnel **188**, positioned adjacent the single portion cannabis distributing device **24**, for receiving the single dose of cannabis therefrom, a paper cone holder **190**, positioned under the funnel **188**, for receiving and holding a paper cone **14** therein, a pusher mechanism **192** for positioning the paper cone holder **190** in abutment with the funnel **190**, and a reciprocating needle mechanism **194** that includes a needle **196** and a needle actuating mechanism **198** that causes the needle **196** to be moved in the paper cone holder **190** and to reciprocate while being moved out of the paper cone holder **190**.

The funnel **188** includes a base portion **189** that is removably secured to the base **134** via a generally L-shaped mounting bracket **200** and includes an integral peripheral flange **202** for its securing thereto. The configuration and size of the base portion **189** is adapted for specific configuration and size of the paper cone **14** as will now be described in more detail. The funnel **188** further includes a neck portion **191** that is removably mounted to the base portion **189** therein.

The outer wall of the base portion **189** of the funnel **188** is thinner at the end **212** thereof opposite the neck portion **191**. As will be explained hereinbelow in more detail, this thinning of the outlet portion **212** of the funnel **188** aims at facilitating the insertion of the top opening portion **214** of a paper cone **14** thereabout.

The generally L-shaped mounting bracket **200** includes a first portion **204** that is secured to the base **134** and a second generally planar hollow portion **206** that extends from the first portion **204** so as to be generally parallel to the base **134**. The funnel **188** is attached to the generally planar hollow portion **206** via its flange **202** using fasteners **208**.

The hollow portion **206** has an opening **210** that is concentric with the outlet **212** of the funnel **188**. A collar flange **211** is provided in the opening **210**, which yields a gradually narrowing passage for the paper cone **14** therein. The opening yielded by the collar flange **211** being wider than the outlet **212** of the funnel **188**, this facilitates the insertion of the top portion **214** of the paper cone **14** therethrough for positioning about the outlet **212** of the funnel **188**.

The cannabis joint filling apparatus **12** further includes an air blaster (only the exit nozzle **256** thereof being shown) that pushes air into the funnel **188** during the positioning of a paper cone **14**. The blasted air forces that the paper cone **14** remains open during the positioning of its opening **214** around the outlet **212** of the funnel **188**.

The paper cone holder **190** is in the form of an elongated body having a frusto-conical bore **216** therein that is configured and sized to receive a paper cone **14** therein in a snugly fit manner so as to prevent the deformation and breakage of a cone **14** therein during its filling by cannabis.

## 11

The paper cone holder **190** is one of a series of such holders **190** that are freely mounted in corresponding holes **217** in a carousel **218**. The carousel **218** is provided to facilitate the consecutive filling of a plurality of paper cones **14**.

According to another embodiment (not shown), the paper cone holder **190** is mounted to another support or mechanism than the carousel **218** that can allow receiving and supporting a single paper cone holder or sequentially a plurality thereof.

The paper holder **190** includes a wider head portion **220**, defining a shoulder portion **222** that provides support to the holder **190** when deposited into the hole **217**.

The pusher mechanism **192** includes a pushed rod **224**, having a flat head **225** at the distal end thereof, that is aligned with the funnel **188** under the carousel **218**. The pusher mechanism **192** further includes a rod actuating mechanism **226** that controllably causes the rod **224** to be moved upwardly so as to bring the head portion **220** in abutment with the hollow portion **206** of the bracket **200** (see FIG. **8B**). As can be seen in FIG. **8B**, this positioning of the paper holder **190** causes the wider top portion **214** of the paper cone **14** therein to slip around the outlet **212** of the funnel **188**.

The pusher rod **224** is slidably mounted into a sleeve **227** so as to extend partially therefrom. The sleeve **227** includes a top flange **229** for securing the sleeve **229** to a table or to another structure (not shown).

The rod actuating mechanism **226** includes a mounting bracket **228** that mounts the pusher mechanism **192** to the table so that the pusher rod **192** is under the funnel **188**, aligned with the outlet **212** thereof.

The rod actuating mechanism **226** further includes a rotary actuator **230** fixed to the mounting bracket **228**, an eccentric pulley assembly **232** mounted to both the rotary actuator **230** and pusher rod **224** therebetween that transform the rotational movement of the output shaft **234** of the rotary actuator **230** into a reciprocating movement of the rod **224** within the sleeve **227**.

In operation, the rod actuating mechanism **226** is actuated each time the carousel **218** brings a new paper cone holder **190**, with a paper cone **14** therein, in alignment with the funnel **188** so as to insert the opening **214** of a paper cone **14** around the outlet **212** of the funnel **188**. In such a position, the paper cone **14** is ready to be filled with the single dose **15** portion of cannabis. When the paper cone **14** is filled with such a dose **15**, the rod actuating mechanism **226** is further energized to lower the rod **224**, which causes the cone holder **190** to also lower to its resting position within the carousel **218**. This process is performed for each new paper cone **14** and holder **190** in the carousel **218**.

The chute **182** includes a V-shaped channel **94** and a pneumatic vibrator **100** operatively coupled thereto. The V-shaped channel **94** is adjustably mounted to the planar portion **206** of the mounting bracket **200** through an azimuthal mount **236**. According to another embodiment (not shown) the V-shaped channel is fixedly or adjustably positioned between the single portion cannabis distributing device **24** and funnel **188** using another support, mechanism or assembly than illustrated.

The vibrator **100** of the chute **182** is operated so as to yield a regular vibration.

The cannabis joint filling apparatus **12** is not limited to include the illustrated funnel **188**, paper cone holder **190**, pusher mechanism **192** and/or carousel **218**, and other mechanisms or assemblies can be provided to bring a paper

## 12

cone **14** in filling proximity with the single portion cannabis distributing device **24** for its filling.

The reciprocating needle mechanism **194** comprises a linear actuator **198**, including a movable carriage **238** to which the needle **196** is attached.

The needle **196** includes a conical tip **240** that is shaped to be largest at its free end **242**. More specifically, the diameter of the tip **240**, at its free end **242**, is slightly smaller than the diameter of the paper cone **14** and of the bottom **243** of the bore **216** of the paper cone holder **190**.

As described hereinabove, the needle actuating mechanism **198** is controlled to move the needle **196** in the paper cone holder **190** and to reciprocate while being moved out of the paper cone holder **190**.

The operation of the cannabis joint filling apparatus **12** will now be described with references to FIGS. **2** and **8A-8P**.

As described hereinabove, the single portion cannabis distributing device **24** simultaneously i) receives cannabis from the feeding cone **32** and hold it while it is weighed by the weighing scale **20** so as to yield a single dose **15** of cannabis in one of its cups **26**, while ii) the other cup **26** emptying another such single dose **15** of cannabis into a paper cone **14** held in the paper cone holder **190**.

After an empty paper cone **14** is fed into the holder **190**, and previously to afore-mentioned simultaneous steps, the pusher mechanism **192** is actuated to position the paper cone holder **190** in abutment with the funnel **188** (see arrows **244** in FIG. **8A**). As described hereinabove, this positions the paper cone **14** about the outlet **212** of the funnel **188** (see FIG. **8B**).

The operation of the needle **196** during the emptying of the cup **26** into the paper cone **14** will now be described in more detail with references to FIGS. **8D-8P**, which results in the pre-compacting of the cannabis in the paper cone **14**.

FIG. **9** summarizes the method of pre-compacting the single dose **15** of cannabis in the paper cone **14**.

The linear actuator **198** is first operated to move the needle **196** within the paper cone **14** in the paper cone holder **190** (see arrow **246** in FIG. **8B**) until the tip **242** gently reaches the bottom **243** of the bore **216** thereof, and therefore of the cone **14** therein (see FIG. **8C** and step **306** in FIG. **9**).

When the filling of the cone **14** is initiated by the single portion cannabis distributing device **24** (see arrow **248** in FIG. **8D** and step **308** in FIG. **9**), the linear actuator **188** gradually raises the needle **196** (step **310** in FIG. **9**) while simultaneously inferring to the needle **196** a reciprocating movement within the cone **14** (step **312** in FIG. **9**). The result of these two combine movements of the needle **196** is that the needle **196** is sequentially raised a first distance (see arrow **250** in FIGS. **8E**, **8G**, **8I**, **8K**, **8M** and **8O**) and the lowered a second distance that is shorter than the first distance (see arrow **252** in FIGS. **8F**, **8H**, **8J**, **8L**, **8N** and **8P**).

The resulting movements of the needle **196**, which are illustrated in FIGS. **8E-8P**, continue until the tip **242** of the needle **196** completely exits the paper cone **14**.

The movements of the needle **196** are controlled to be synchronized with the gradual filling of the paper cone **14** with the single dose **15** of cannabis.

It is to be noted that the operation of the needle **196**, and more specifically of its speed of movements, are adapted to the type of cannabis. For example, the total time to raise the needle **196** is for example between 0.5 and 1.5 seconds, while the reciprocating frequency is between 0.25 and 0.75 second.

The result of the above-described operation of the needle **196** during the filling of the paper cone **14** is the pre-

13

compaction of the single dose **15** of cannabis **15** within the paper cone **14** after its filling.

At the same time of the above-described movements of the needle **196**, the flat head **225** of the pusher rod **224** remains in abutment with the paper cone holder **190** and the pusher mechanism **192** is operated to cause the pushed rod **224** to reciprocate rapidly, inducing vibrations onto the paper cone holder **190** and paper cone **14** therein (step **314**). This has been found to improve both the filling and pre-compacting of the single dose of cannabis **15** into the paper cone **14**.

According to another illustrative embodiment, the pusher rod **224** remains still during the filling step.

Since an air blaster is believed to be well known in the art, it will not be described herein in more detail for concision purposes.

It is to be noted that all the actuators described hereinabove are connected to one or more controllers (not shown) so that their operations are triggered and synchronized thereby. All the connectors between such controller(s) and the actuators have been omitted in the drawings so as to alleviate the views.

It is to be noted that many modifications could be made to the cannabis joints filling system **10** described hereinabove and illustrated in the appended drawings. For example:

anyone or both chutes **44** can be replaced by another element or system allowing transferring the cannabis from one subsystem of the system **10** to the other.

According to still another embodiment, anyone or both chutes are omitted; and

the configuration, size and number of the mounting elements may be different than illustrated.

Although a cannabis joints filling system has been described hereinabove by way of illustrated embodiments thereof, it can be modified. It is therefore to be understood that numerous modifications may be made to the illustrative embodiments and that the scope of the claims should not be limited by the preferred embodiment but should be given the broadest interpretation consistent with the description as a whole.

What is claimed is:

**1.** A cannabis joints filling system comprising:

a cannabis joint filling apparatus for receiving and holding a paper cone along a longitudinal axis and for receiving and pre-compacting a predetermined quantity of cannabis into the paper cone; and

a cannabis feeding system including i) a weighing scale, ii) a cannabis feeding apparatus adjacent the weighing scale for receiving cannabis in bulk and for controllably outputting a predetermined portion of the cannabis in bulk onto the weighing scale, and iii) a device for distributing a single portion of cannabis, including two cups that are sequentially movable between a) a cannabis weighing position, wherein one of the two cups cooperates with the weighing scale to measure the predetermined portion of the cannabis, and b) a cannabis distributing position, where the predetermined portion of the cannabis is fed to the cannabis joint filling apparatus wherein the cannabis feeding apparatus including:

a support frame;

a feeding cone defining a large inlet for said receiving cannabis in bulk and a narrow outlet for said controllably outputting a predetermined portion of the cannabis in bulk onto the weighing scale; the feeding cone being mounted to the support frame for rotation about

14

a rotational axis that is so angled relative to a horizontal axis that the inlet is higher than the outlet; the feeding cone having an inner surface and including a spiral shaped protrusion on the inner surface; and

an actuating mechanism secured to the frame and operatively coupled to the feeding cone for selectively causing the rotation of the feeding cone;

whereby, in operation, cannabis fed in bulk into the inlet of the feeding cone is gradually moved to the outlet thereof by the spiral shaped protrusion when the feeding cone is caused to rotate by the actuating mechanism.

**2.** The cannabis joints filling system as recited in claim **1**, wherein the cannabis feeding apparatus further includes:

a cone extension secured to the feeding cone at the inlet thereof so as to be in fluid communication therewith and defining a recipient to receive the cannabis in bulk; whereby, in operation, cannabis fed in bulk into the cone extension is brought by gravity to the inlet of the feeding cone.

**3.** The cannabis joints filling system as recited in claim **1**, wherein the support frame includes a plate having a circular opening that receives the feeding cone therein for the rotation about the rotational axis.

**4.** The cannabis joints filling system as recited in claim **3**, wherein the actuating mechanism includes a rotary actuator and a transmission, both secured to the plate;

the transmission operatively coupling the actuating mechanism and the feeding cone.

**5.** The cannabis joints filling system as recited in claim **1**, further comprising a chute between the cannabis feeding apparatus and the weighing scale for transferring by gravity some of the cannabis in bulk from the cannabis feeding apparatus onto the weighing scale.

**6.** The cannabis joints filling system as recited in claim **5**, wherein the chute includes a V-shaped channel.

**7.** The cannabis joints filling system as recited in claim **6**, further comprising at least one sensor so mounted to the support frame as to have a line of sight to the V-shaped channel for detecting a flow of cannabis between the cannabis feeding apparatus and the weighing scale; the flow of cannabis being used for said controllably outputting a predetermined portion of the cannabis in bulk onto the weighing scale.

**8.** The cannabis joints filling system as recited in claim **6**, wherein the chute further includes a vibrator secured to the V-shaped channel to induce vibrations thereon.

**9.** The cannabis joints filling system as recited in claim **8**, wherein the vibrator is controllable to induce stronger first vibrations that are regular and then fainter second vibrations that gradually diminish relative to the first vibrations.

**10.** The cannabis joints filling system as recited in claim **5**, further comprising a controllable gate positioned downstream from the chute and upstream from the weighing scale, for controlling a flow of cannabis therebetween.

**11.** The cannabis joints filling system as recited in claim **10**, wherein the controllable gate includes a recipient that is mounted above the weighing scale; the container having an opening and a bottom that is movable between a first position that blocks the opening and a second position that yields a passage through the opening.

**12.** The cannabis joints filling system as recited in claim **11**, wherein the opening of the recipient is frusto-conical.

**13.** The cannabis joints filling system as recited in claim **11**, wherein the bottom is slidably mounted to the recipient; the controllable gate further including a linear actuator for selectively sliding the bottom relatively to the recipient.

15

14. A cannabis joints filling system comprising:  
 a cannabis joint filling apparatus for receiving and holding a paper cone along a longitudinal axis and for receiving and pre-compacting a predetermined quantity of cannabis into the paper cone;  
 a cannabis feeding system including i) a weighing scale, ii) a cannabis feeding apparatus adjacent the weighing scale for receiving cannabis in bulk and for controllably outputting a predetermined portion of the cannabis in bulk onto the weighing scale, and iii) a device for distributing a single portion of cannabis, including two cups that are sequentially movable between a) a cannabis weighing position, wherein one of the two cups cooperates with the weighing scale to measure the predetermined portion of the cannabis, and b) a cannabis distributing position, where the predetermined portion of the cannabis is fed to the cannabis joint filling apparatus; and  
 at least one sensor for detecting a flow of cannabis between the cannabis feeding apparatus and the weighing scale; the flow of cannabis being used for said controllably outputting a predetermined portion of the cannabis in bulk onto the weighing scale.

15. The cannabis joints filling system as recited in claim 1, wherein the weighing scale is an electronic-type scale.

16. The cannabis joints filling system as recited in claim 1, wherein the device for distributing a single portion of cannabis comprising:  
 a primary support base; and  
 a turntable receiving the two cups; the turntable being mounted to the primary support base for movement about a rotational axis that causes each cup to be positioned alternatively i) adjacent the cannabis joint filling apparatus and ii) coaxial with the weighing scale.

17. The cannabis joints filling system as recited in claim 16, wherein the device for distributing a single portion of cannabis further comprising a secondary base that receives the primary support base for reciprocal movement of the primary support base relatively to the secondary support base along the rotational axis between a low position, wherein one of the two cups that is coaxial with the weighing scale is supported by the weighing scale, and a raised position, wherein the one of the two cups that is coaxial with the weighing scale is distanced from the weighing scale.

18. The cannabis joints filling system as recited in claim 17, wherein each one of the two cups is mounted to the turntable via an actuator for pivotal movement about a pivot axis, that is generally perpendicular to the rotational axis, between an upright position, wherein said each one of the two cups is right side up, and a tilted position more than

16

ninety (90) degrees relative to a horizontal axis, which causes said each one of the two cups to be emptied of any content therein.

19. The cannabis joints filling system as recited in claim 18, wherein each cup is further mounted to the actuator via a mounting bracket for free movements towards a rested position, wherein the cup is supported by the mounting bracket;  
 whereby, in operation, the weighing position corresponds to a) the cup being coaxial with the weighing scale, while b) the primary support being in its low position, and c) while the cup being in its upright position; the cannabis distributing position corresponding with a) the cup being positioned adjacent the cannabis joint filling apparatus, while b) the primary support being in its low position, and c) while the cup being in its tilted position.

20. The cannabis joints filling system as recited in claim 1, wherein the cannabis joint filling apparatus includes a paper cone holder for receiving and holding the paper cone adjacent the device for distributing a single portion of cannabis so as to be in fluid communication with one of the two cups thereof when said one of the two cups is in the cannabis distributing position.

21. The cannabis joints filling system as recited in claim 20, wherein the cannabis joint filling apparatus further including a funnel positioned above the paper cone holder and oriented along the longitudinal axis; the funnel orienting the cannabis fed to the cannabis joint filling system towards the paper cone held by the paper cone holder.

22. The cannabis joints filling system as recited in claim 21, further comprising a chute between the device for distributing a single portion of cannabis and the funnel.

23. The cannabis joints filling system as recited in claim 22, wherein the chute includes a V-shaped channel.

24. The cannabis joints filling system as recited in claim 23, wherein the chute further including a vibrator secured to the V-shaped channel to induce vibrations thereon.

25. The cannabis joints filling system as recited in claim 1, wherein the cannabis joint filling apparatus further including i) a reciprocating needle mechanism including a needle, having a conical tip, and ii) an actuating mechanism to controllably cause the needle to reciprocate in the paper cone along the longitudinal axis while moving from a first position, wherein the conical tip is at a bottom of the paper, and a second position, wherein the conical tip is out of the paper cone.

26. The cannabis joints filling system as recited in claim 25, wherein the conical tip of the needle has a widest portion at a free end thereof.

\* \* \* \* \*